The School Leaders' Role in Students' Mathematics Achievement Emma P. Bullock Utah State University | ekpbullock@gmail.com

Conceptual Framework: Complexity Theory



(Mowat & Davis, 2010; Jordan, 2010)

Research Design

Explanatory sequential mixed method design to answer what the school leaders' role is in students' mathematics achievement in the context of complexity theory.

Quantitative

Quantitative data were collected via a survey (revised Principal's Questionnaire) to answer the research questions.

158 leaders From Utah K-12 public and charter schools

Qualitative

Qualitative data from focus group interviews were used to explain the quantitative results. Interviewees were school leaders selected based on their school's performance on SAGE tests, relative to their demographics.

5 leaders	HIGHER
6 leaders	AS EXPECTED
6 leaders	LOWER

Quantitative Phase

Data Analysis

- Preliminary Descriptive Analysis
- Randomized Forests and Variable Importance Plots
- Preliminary Model Assumptions & Correlation Analysis
- Network Analysis
- Post-Hoc Regression Analysis
- Multiple Regression Analysis

Final predictive model based on complexity theory:

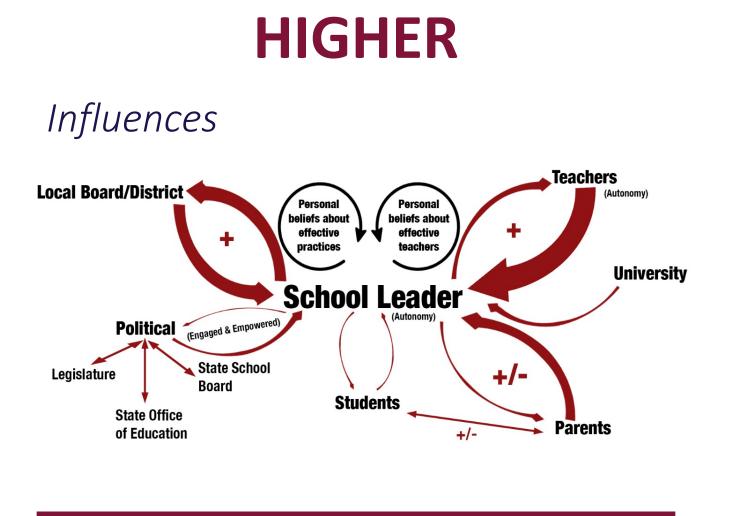
- A significant regression equation was found (F(13,65) = 6.91, p < .001), / with R^2 of .580.
- Evidence of interaction effects and multiplicative looping effects, indicating emergent phenomena.

	b	SE	t	р
Intercept	109.69	38.78	NA	NA
Inf_State_Leg2	2.77	.99	2.82	.006
*MTL39				
Inf_State_Leg2	-8.26	3.63	-2.28	.026
MTL39	-6.93	3.71	-1.87	.066
Math_Ed*MTL	-13.79	8.06	-1.71	.092
62				
Math_Ed	53.15	28.55	1.86	.067
MTL62	10.76	8.90	1.21	.231
Inf_Teach3	-8.88	3.68	-2.42	.019
Inf_Nat_Org2	-3.22	1.20	-2.69	.009
Age	35	.18	-1.89	.064
Fam_PD_CI_D	-2.34	1.20	-1.95	.056
oc				
ISAM18	2.95	1.40	2.11	.039
%LowSES	25	.09	-2.92	.005
%EthMin	03	.10	32	.75
<i>Notes</i> . $R^2 = .58$				

Qualitative Phase

Data Analysis

Constant comparative analysis procedures



Shared vision of math education

School Leader Decisions and Actions • Inquiry-based learning: Tier I

- instruction strongly established
- **Teachers:** Collaboration, distributed leadership, heterogenous grouping
- Supports for Students: Heavy on licensed teachers w/support from technology

AS EXPECTED

Influences Personal beliefs about effective practices Personal beliefs about effective teachers School Leader State Office of Education

Disparate vision of math education Trying to move towards a shared vision

School Leader Decisions and Actions

- Traditional methods vs. Inquiry**based learning:** Tier I generally established with exceptions
- **Teachers:** Positive mindset; ability grouping; school leader
- Supports for Students: Licensed teachers/aides w/support from technology

Research Questions

1. What characteristics of the school leader are most important in predicting students' mathematics achievement?

2. What is the relationship between students'

mathematics achievement and these characteristics of the school leader?

Perception of state

on curriculum

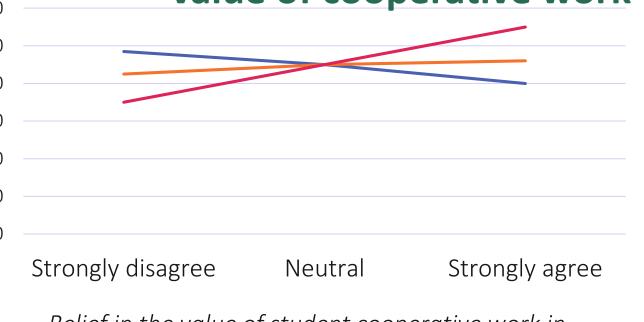
-No influence

legislature's influence

—Moderate influence

-Strong influence

Interaction effects of school leaders' perceptions of state legislative influence and value of cooperative work

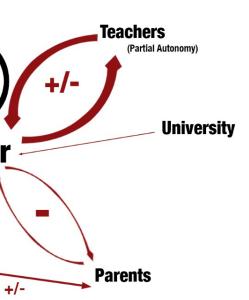


Belief in the value of student cooperative work in student mathematics achievement

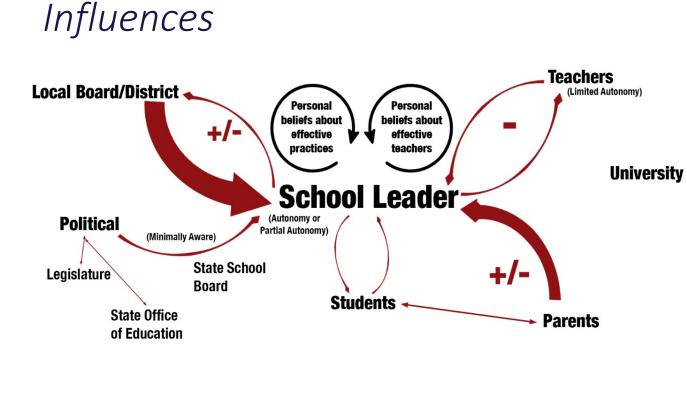
Research Questions

1. What relationships with stakeholders in the schools influence school leaders' decisions?

2. What decisions and actions are being made by school leaders?



LOWER



Disparate vision of math education

Few attempts to move towards a shared vision

School Leader Decisions and Actions

- Focus on Basics: Tier I not well established
- **Teachers:** Aligning curriculum w/standards, hiring quality teachers, ability grouping, school leader
- Supports for Students: Heavy on aides/volunteers & technology

Research Question

How are school leaders' decisions and actions associated with students' mathematics achievement?

Results

All groups of school leaders said it was their role to build the capacity of the faculty and students.

Facilitat shared the cult mathen educat school.

school:

- Especially between administration, teachers, and local school board/district office
- Supporting inquiry-based learning and teacher collaborative practices
- Promoting heterogenous grouping
- Focus on hiring and retaining high quality teachers • Supporting sustained, coordinated, longitudinal
- teacher professional development
- Supporting distributed leadership practices
- Supporting distributed ownership of data
- Evaluation and feedback practices based on well-
- articulated plans developed with teachers and based on trust
- Supporting teacher created materials with textbook as resources.
- Utilizing university resources
- Partnering with parents • Engaging in empowered political discourse

Mixed Phase

IGHER	AS EXPECTED	LOWER
ting a	Setting	Coaching and
vision of	expectations	mentoring,
ture of	driven by data	evaluating and
matics	and holding	giving feedback in
ion at their	faculty	a one-directional
	accountable.	way.

Overall Result

The school leaders' role is to **facilitate a shared vision of** mathematics education between stakeholders in their

References available upon request