Classroom Activities and Organization: Predictors of Children's Self-Regulation and Academic Achievement Gains

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Outline

- Rationale
- Background
- Method
- Results
- Discussion
- Implications for Teaching and Learning

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Rationale

- Rapid neurological, cognitive, and socio-emotional development in early childhood
(Bowman, Donovan, & Burns, 2000; Shonkoff & Philips, 2000)

- Persistent SES achievement gap
(Hart & Risley, 1995; Whitehurst & Lonigan, 1998; Reardon, 2011)

- Can preschool classroom experiences optimize and equalize learning opportunities for young children from disadvantaged backgrounds?

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Importance of Early Self-Regulation and Academic Skills

Greater self-regulation and academic skills in early childhood are associated with:

- better adaptation to formal schooling
  (Rimm-Kaufman, Pianta, & Cox, 2000)

- later academic achievement (Duncan et al., 2007)

- lower rates of delinquency and aggressive/disruptive behavior (Moffitt et al., 2011)

What Role Does the Preschool Classroom Play in Facilitating Self-Regulation and Academic Gains?

- Better classroom emotional climate linked to academic gains (Pianta, Belsky, Vandergrift, Houts, & Morrison, 2008)

- More engagement in quality classroom activities linked to better academic outcomes (Cameron Ponitz, Rimm-Kaufman, Grimm, & Curby, 2009)

- Children in experimental condition of *Chicago School Readiness Project* showed greater self-regulation and academic achievement compared to a control group (Raver et al., 2008; 2011)

Opportunity Provided by Current Study

- There were no curriculum effects on children's gains in self-regulation or academic achievement

- However, classrooms differed in how much children gained in both sets of skills over the prekindergarten year

- Detailed observational data taken in all 60 classrooms provide an opportunity to examine the influence of various classrooms factors on self-regulation and achievement

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Current Study

- Examine associations between classroom processes and both academic and self-regulation gains across preschool year
  - Classroom processes
    - Emotional climate
    - Instructional quantity
    - Level of instruction and engagement
    - Levels of talking/listening for both teacher and students
  - Battery of measures captured self-regulation and academic skills

Method: Classroom Characteristics

Variable	Tools Condition	Comparison Condition	Overall
Fall Class Size	17.31	17.86	17.57
Spring Class Size	17.25	17.71	17.47
Fall ELL Status (% of class)	28.90	12.10	28.29
Spring ELL Status (% of class)	29.50	29.68	29.58
Fall IEP Status (% of class)	10.00	12.10	10.98
Spring IEP Status (% of class)	11.28	13.38	12.26

Method: Teacher Characteristics

Variable	Tools Condition (N=32)		Comparison Condition (N=28)		Overall (N=60)	
Full Sample	Mean/Freq	Range/%	Mean/Freq	Range/%	Mean/Freq	Range/%
Years of Experience						
Years Teaching	12	2-30	12.1	1-34	12	1-34
Years Teaching Pre-K	7.7	2-22	6.6	1-17	7.1	1-22
Education Level						
Bachelor's Degree	12	38%	17	61%	29	48%
Some Graduate Coursework	11	34%	5	18%	16	27%
Master's Degree	9	28%	6	21%	15	25%
Licensure Area						
Early Childhood (Birth-K)	19	60%	18	64%	37	62%
Pre-K- 3rd	2	6%	1	3%	3	5%
Elementary Ed (Pre-K- 3,4,8)	8	25%	8	29%	16	26%
Early Childhood and Spec Ed	3	9%	1	4%	4	7%

Methods for Describing Preschool Classroom Processes

- *Narrative Record* documents how overall classroom time is distributed among activities and records teacher behavior
  - Teacher behavior reminders and reinforcers during each episode
  - Time spent in preschool activities
  - Overall levels of instruction and engagement

- *Teacher Observation in Preschool (TOP)* (behavioral counts)
  - Teaching tasks and emotional tone (e.g. Behavior approving, disapproving)
  - Proportion of time spent in academic activities and level of instruction
  - Talk, listen and to whom

- *Children's Observation in Preschool (COP)* (behavioral counts)
  - Proportion of time spent in academic activities (teacher- or child-directed)
  - Talk, listen and to whom
  - Child self talk

Outcome Measures

- Composite Self-Regulation (derived from PCA)
  - Attention
    - DCCS
    - Copy Design
  - Working Memory
    - Forward Corsi Blocks
    - Backward Corsi Blocks
  - Inhibitory Control
    - Peg Tapping
    - Head Toes Knees Shoulders

- Composite Woodcock-Johnson Achievement Scales (derived from PCA)
  - Language
    - Picture Vocabulary
    - Oral Comprehension
    - Academic Knowledge
  - Literacy
    - Letter-Word Identification
    - Spelling
  - Mathematics
    - Applied Problems
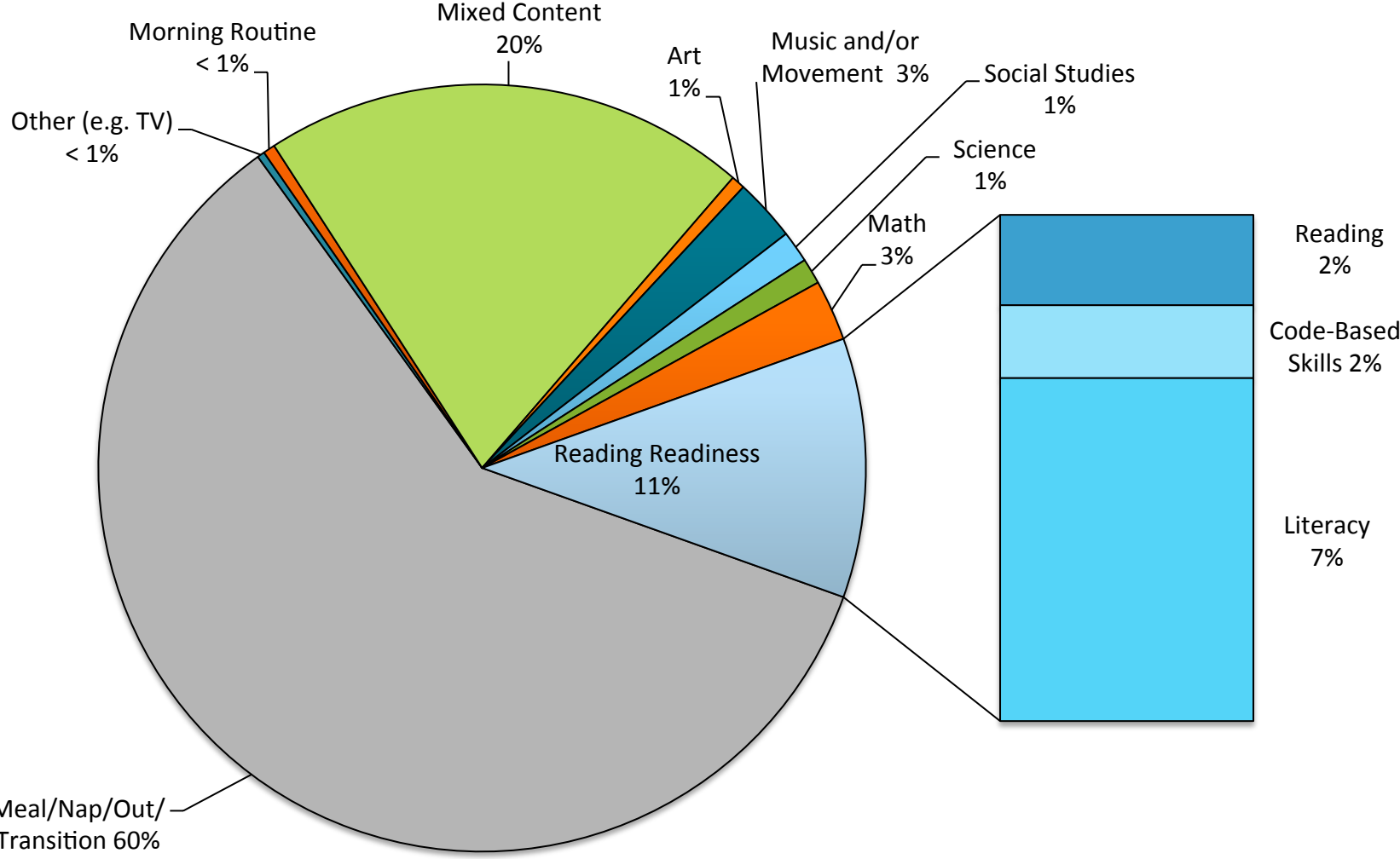   - Quantitative Concepts

Narrative Record of Classroom

Total Time in Learning Opportunities Across the Full Pre-K Day

FULL SAMPLE: Proportion of Time Spent in Preschool Activities

- Whole Group 17%
- Small Group 4%
- Small Group Centers 4%
- Centers 14%
- Transition 13%
- Meal, Nap, Out 48%
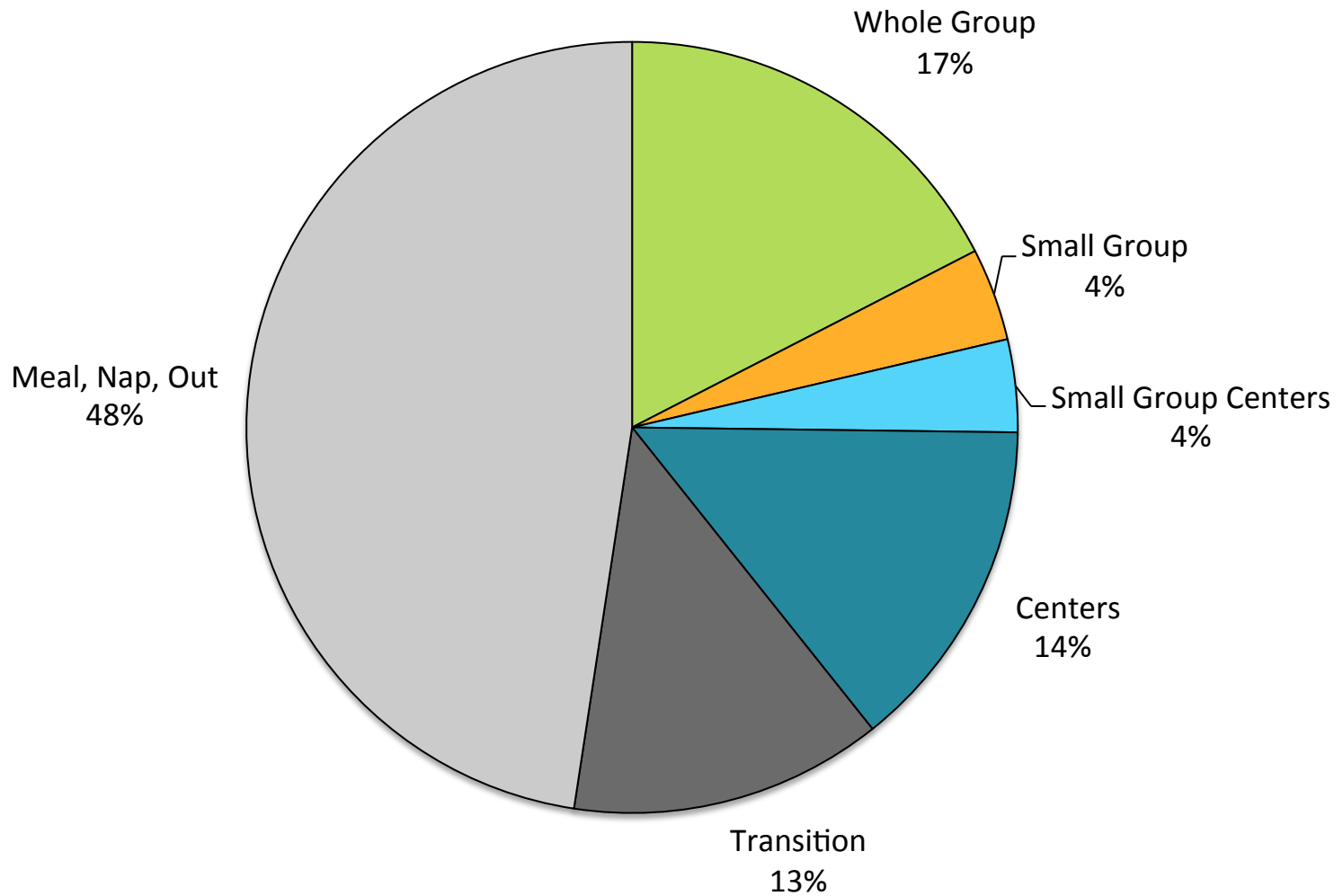
Learning Foci Across the Full Pre-K Day

FULL SAMPLE: Proportion of Time Spent in Preschool Content Areas

- Morning Routine < 1%
- Other (e.g. TV) < 1%
- Mixed Content 20%
- Art 1%
- Music and/or Movement 3%
- Social Studies 1%
- Science 1%
- Math 3%
- Reading Readiness 11%
- Meal/Nap/Out/Transition 60%
- Reading 2%
- Code-Based Skills 2%
- Literacy 7%

Classroom Predictors of Self-Regulation Gains: Narrative

Variable	Standardized Estimate	t-ratio	p
Emotional Climate			
Positive Behavior Reinforcers	0.05	1.64	0.11
Behavior Reminders	-0.08	-2.73	0.01
Quantity of Instruction			
Proportion of Day Spent in Mathematics	0.07	2.32	0.02
Proportion of Day Spent in Literacy	-0.004	-0.09	0.93
Proportion of Day Spent in Language Arts	0.05	1.58	0.12
Proportion of Day Spent in Reading	0.01	0.30	0.73
Opportunity to Learn	0.03	0.84	0.41
Proportion of Day Spent in Transitions	-0.01	-0.32	0.75
Level of Instruction and Engagement			
Global Level of Instruction	0.06	1.91	0.06
Global Level of Engagement	0.08	2.55	0.01
Mathematics Level of Instruction	0.02	0.61	0.55
Mathematics Level of Engagement	0.02	0.62	0.54
Literacy Level of Instruction	0.02	0.54	0.59
Literacy Level of Engagement	0.06	1.93	0.06
Language Arts Level of Instruction	-0.02	-0.62	0.54
Language Arts Level of Engagement	-0.03	-0.98	0.33
Reading Level of Instruction	0.04	1.05	0.30
Reading Level of Engagement	0.13	3.6	0.001

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Classroom Predictors of Achievement Gains: Narrative

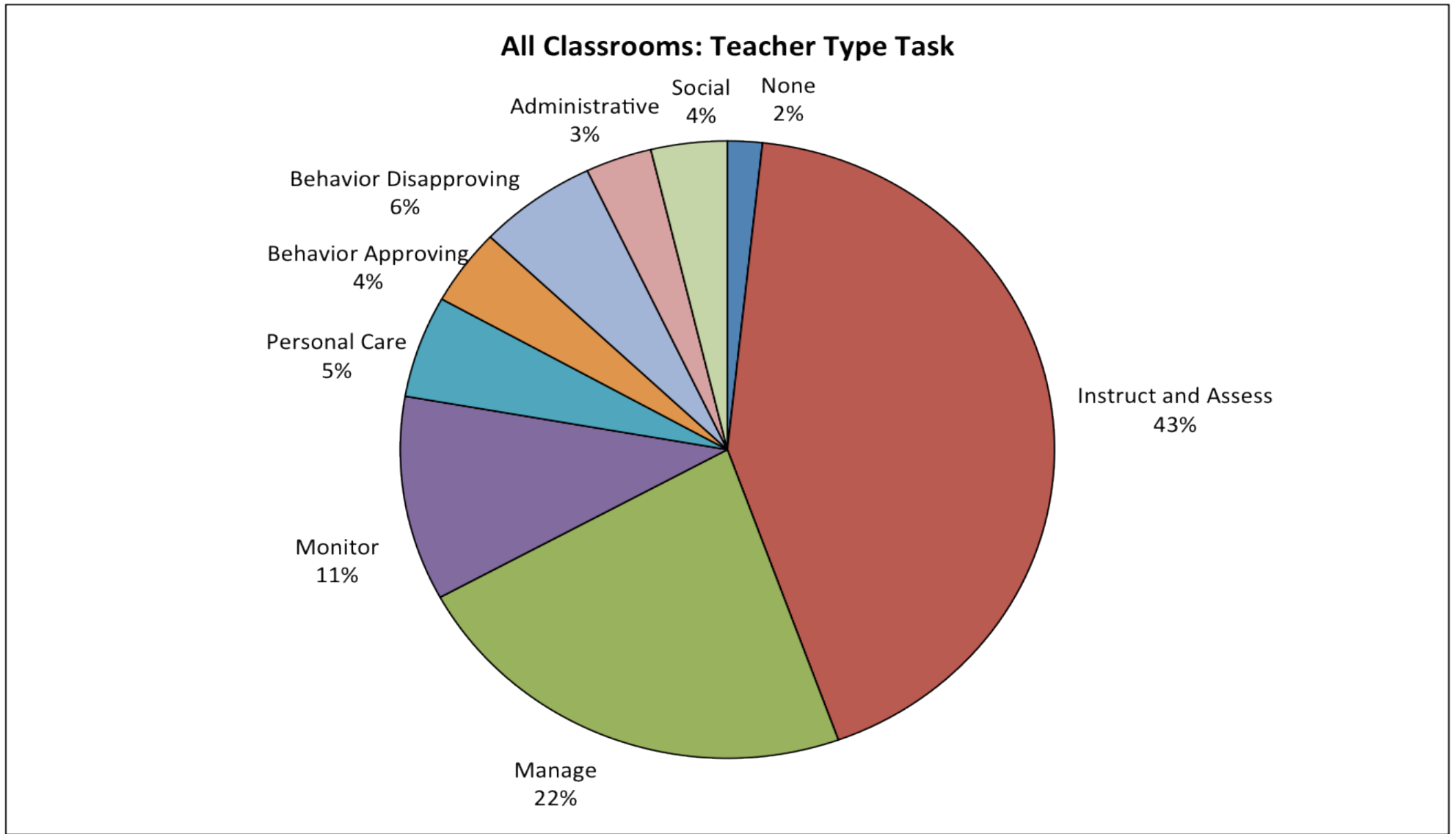| Variable	Standardized Estimate	t-ratio	p
Emotional Climate			
Positive Behavior Reinforcers	0.01	0.54	0.59
Behavior Reminders	-0.05	-2.12	0.04
Quantity of Instruction			
Proportion of Day Spent in Mathematics	-0.01	-0.20	0.85
Proportion of Day Spent in Literacy	-0.05	-1.33	0.19
Proportion of Day Spent in Language Arts	0.05	2.07	0.04
Proportion of Day Spent in Reading	-0.02	-0.76	0.45
Opportunity to Learn	0.05	2.24	0.03
Proportion of Day Spent in Transitions	0.01	0.51	0.61
Level of Instruction and Engagement			
Global Level of Instruction	0.04	1.58	0.12
Global Level of Engagement	0.06	2.64	0.01
Mathematics Level of Instruction	0.004	0.19	0.85
Mathematics Level of Engagement	0.02	0.99	0.33
Literacy Level of Instruction	-0.01	-0.35	0.73
Literacy Level of Engagement	0.08	3.56	0.001
Language Arts Level of Instruction	0.001	0.01	0.99
Language Arts Level of Engagement	0.0001	0.02	0.99
Reading Level of Instruction	0.06	1.86	0.07
Reading Level of Engagement	0.08	2.67	0.01

Summary: General Classroom Processes

- Emotional Climate
  - Less teacher behavior reminders associated with gains in both self-regulation and academic achievement
- Instructional Quantity
  - More learning opportunity associated with more gains in academic achievement
  - More time in mathematics was associated with more gains in self-regulation
- Levels of Instruction and Engagement
  - Engagement was positively associated with both self-regulation and academic achievement gains
  - More engagement in literacy linked to gains
  - Higher engagement in reading associated with both self-regulation and academic gains

Behavioral Observations of Teachers

Teacher Observation in Prekindergarten Classrooms-Tools of the Mind(TOP-ToM)			Page	
Place teacher label here.	**Date**			
	Observer			
	Start Time		**End Time**	

X out

No	**N**o **T**alk	WG	Teacher	Instruction	**0** none	**M**ath	Literacy	Vibrant
Yes	**C**hild	SG	Child	**A**ssess**T**	**1** low	Literacy	Lang**A**rts	Pleasant
Listen	**S**m **G**rp	Centers	SG	**MA**nage	**2** skills	**SC**ience	Reading	Flat
	SGT	SGC	SGT	**B**ehavior	**3** inf	**S**oc.**S**tudies	Writing	Negative
	Wh **G**rp	Transition	WG	**A**pproving	**4** hi inf	Toy	**M**ath	Extreme**N**eg
	WGT	MealTime	WGT	**D**issapp.		**A**rt	**SC**ience	
	Self	Other	Self	Pers/ **C**are		**M**usic/**M**ove	**S**oc.**S**tudies	
	Parent		CT	**MO**nitor		**D**ramatic	**Dr**ama	
	Teacher			**AD**min		**C**omputer	**O**ther	
	Ext **A**dlt			**SOC**ial		**G**ross**M**otor	**N**one	
				None		**W**orksheet		
						TV / video		
						Can't **C**ode		
						None		

Time	SW	Verbal	To Whom	Schedule	Prox	Task	Level of Instrct.	Materials	Focus	Tone Affect
	1									
	2									
	3									

5
6
7

Teacher Tasks
(What teachers are doing during the 3.25 hour learning opportunity)

All Classrooms: Teacher Type Task

- Instruct and Assess 43%
- Manage 22%
- Monitor 11%
- Behavior Disapproving 6%
- Personal Care 5%
- Social 4%
- Behavior Approving 4%
- Administrative 3%
- None 2%

Teacher Tone
(Teachers' affect during 3.25 hours of learning opportunity)

All Classrooms: Teacher Average Tone by Type Task
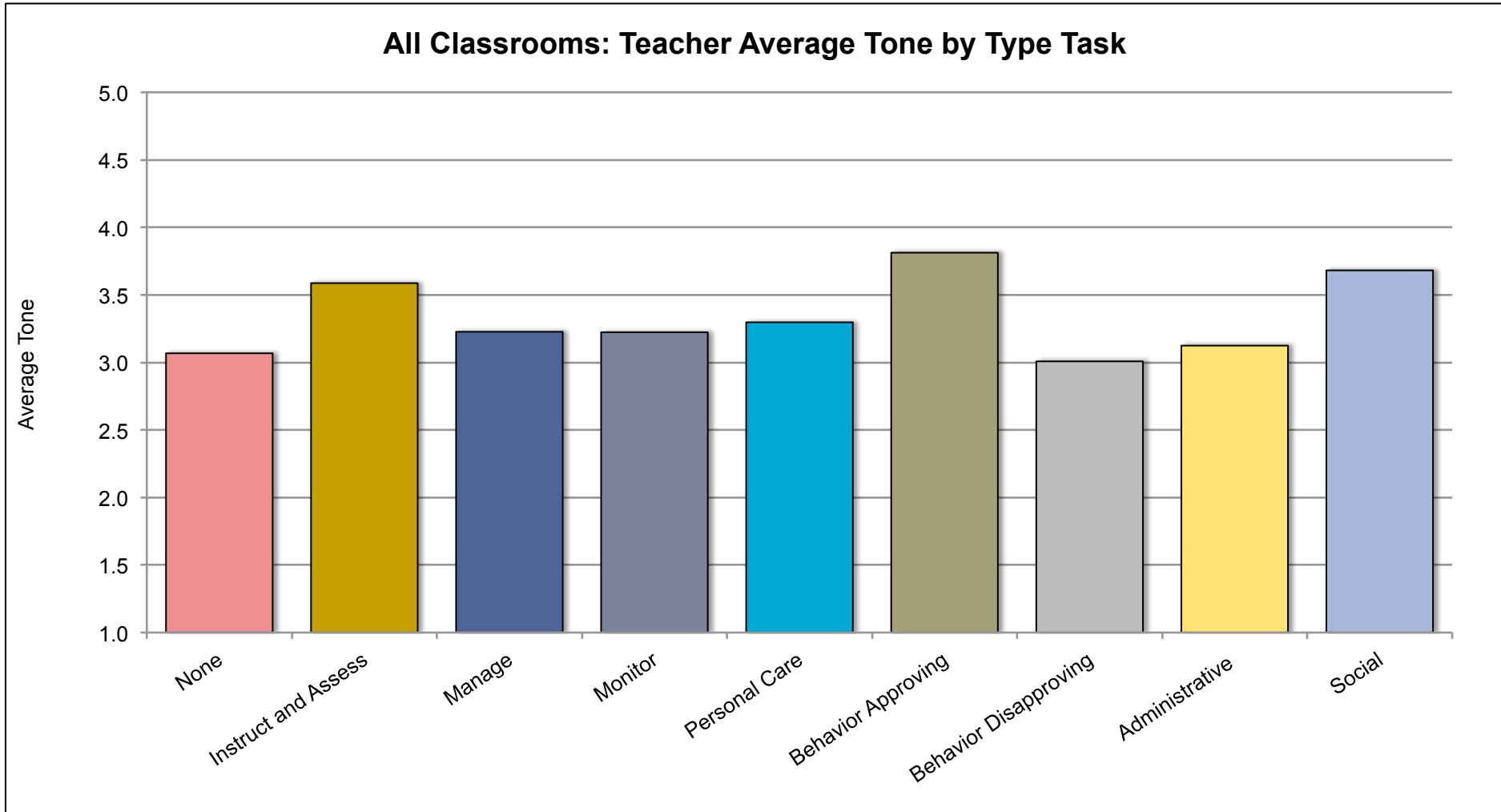
Teacher Verbal Behavior
(Talk by teacher during the 3.25 hour learning opportunity)

All Classrooms: Teacher Talking and To Whom

Not Talking or Listening 20%

Talking 71%

Listening 9%

To Child 35%

To Small Group 7%

To Whole Group 25%

To Self 1%

To Teacher 2%

To Parent/External Adult 1%
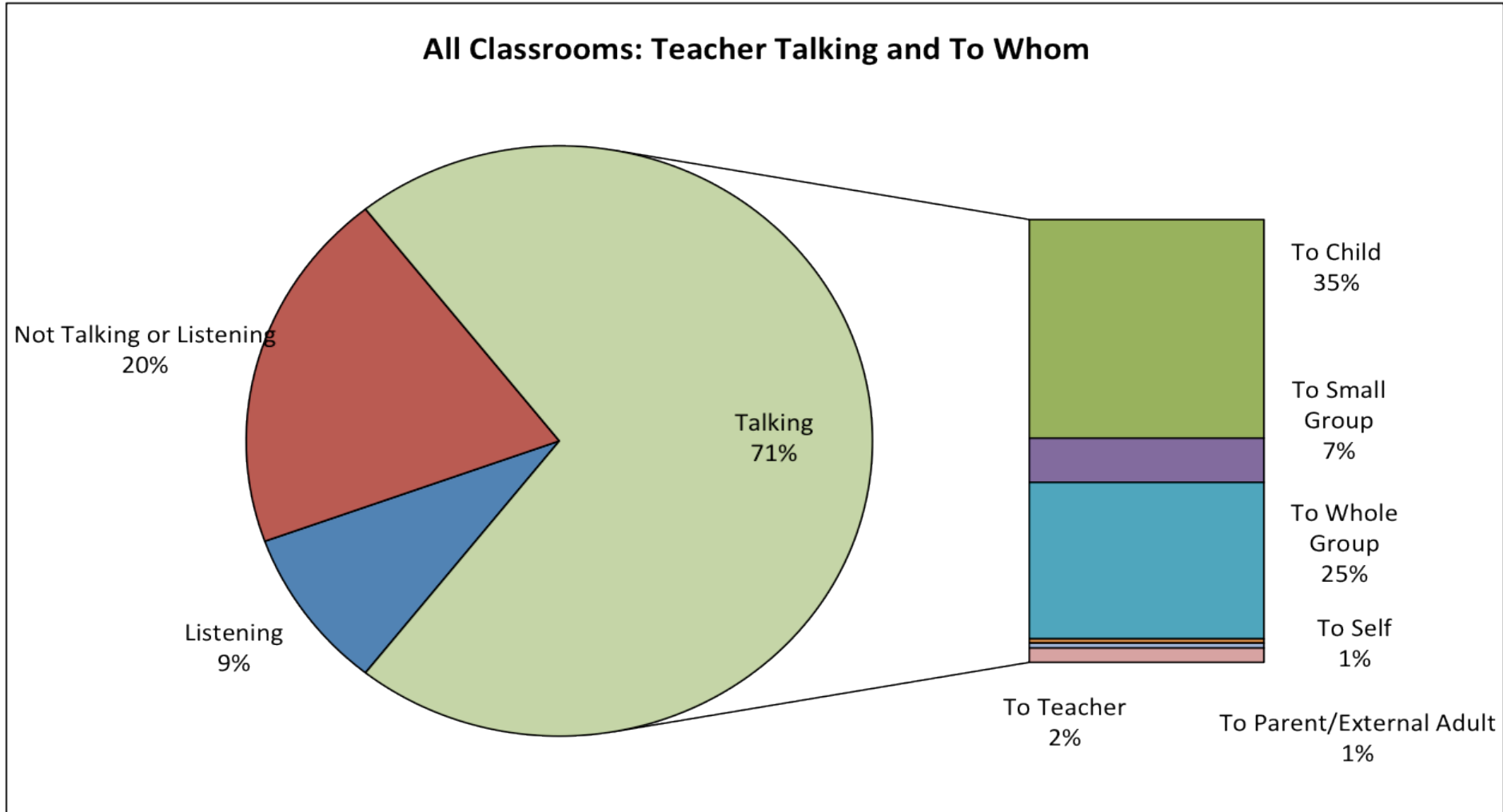
Behavioral Observations of Children

Coding Sheet as it appears on Tablet. Drop down menus have code letters.

No	Teacher	WG	Teacher	NonAcad	Pass Inst	High	Math	Literacy
Yes	Child	SG	Child	Parallel	Non Seq	MedH	Literacy	LangArts
Listen	Sm Grp	Centers	SG	ASsoc	SeQ	Med	SCience	Reading
FssCry	SGT	SGC	SGT	ASsocP	Fantsy Dr	MedL	Soc.Studies	Math
	Wh Grp	Transition	WG	Coop	None	Low	Toy	SCience
	WGT	TransitionI	WGT	CoopP	Other		Art	Soc.Studies
	Self	MealTime	Self	ALone	SOCial		Music/Move	Drama
	No Talk	Other		Onlooker	Disruptive		Dramatic	Other
				SOCial	DisruptiveX		Computer	None
				Unocc	TimeOut		Worksheet	
				TimeOut			TV / video	
							None	
							Can't Code	

Time	SW	Verbal	To Whom	Schedule	Prox.	Interact	Type Task	Invol.	Material	Focus
	1									
	2									
	3									
	4									
	5									
	6									
	7									

Child Verbal Behavior
(Talk by children during the 3.25 hour learning opportunity)

All Classrooms: Children Talking and To Whom

Listening
34%

Fuss/Cry
1%

Talking
24%

Not Talking or Listening
41%

To Teacher
4%

To Child
9%

To Small Group
1%

To Whole Group
4%

To Self
6%

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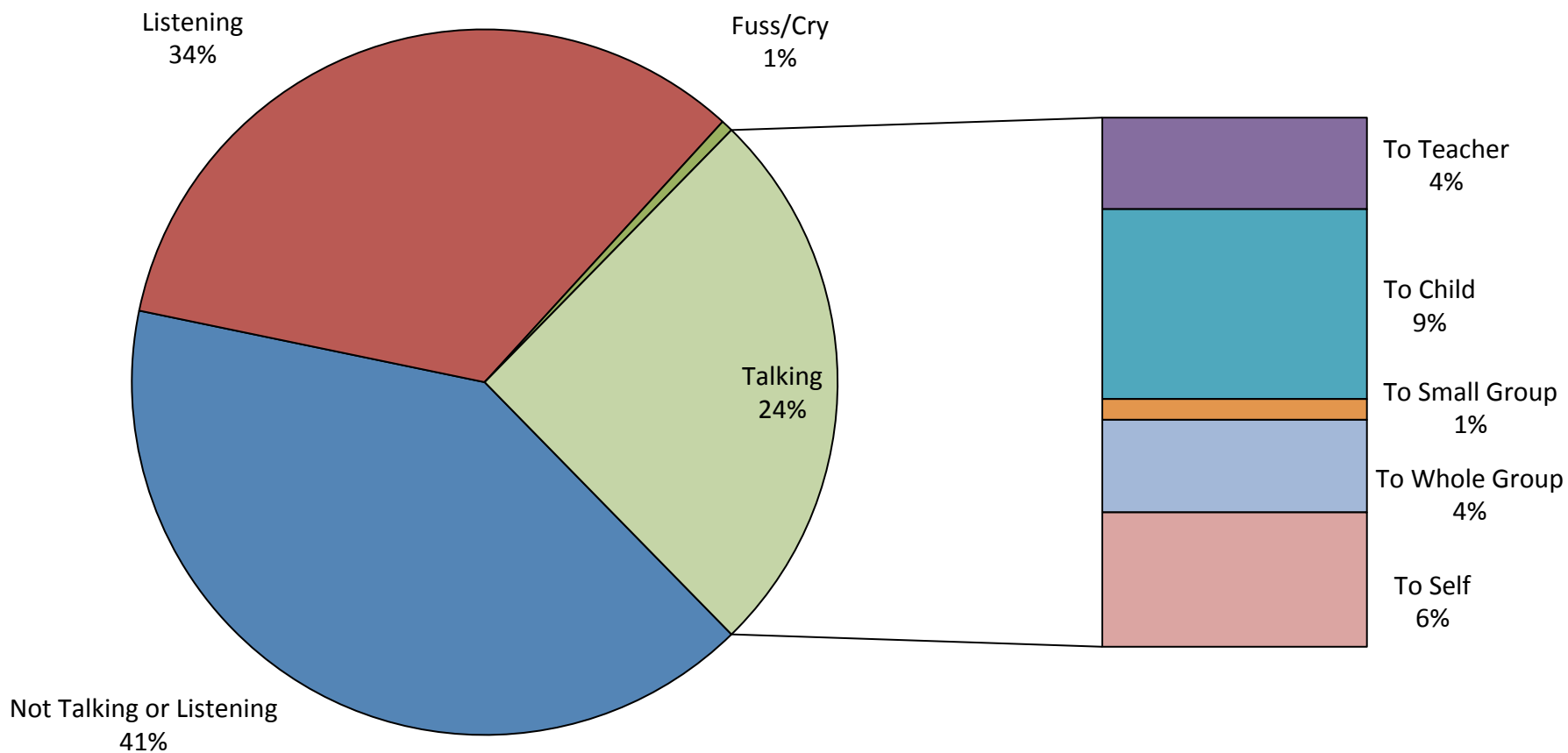
Child Verbal Behavior
(Listen by children during the 3.25 hour learning opportunity)

All Classrooms: Children Listening and To Whom

Talking 24%

Fuss/Cry 1%

Listening 34%

Not Talking or Listening 41%

To Teacher 26%

To Child 7%

To Small Group <1%

To Whole Group <1%
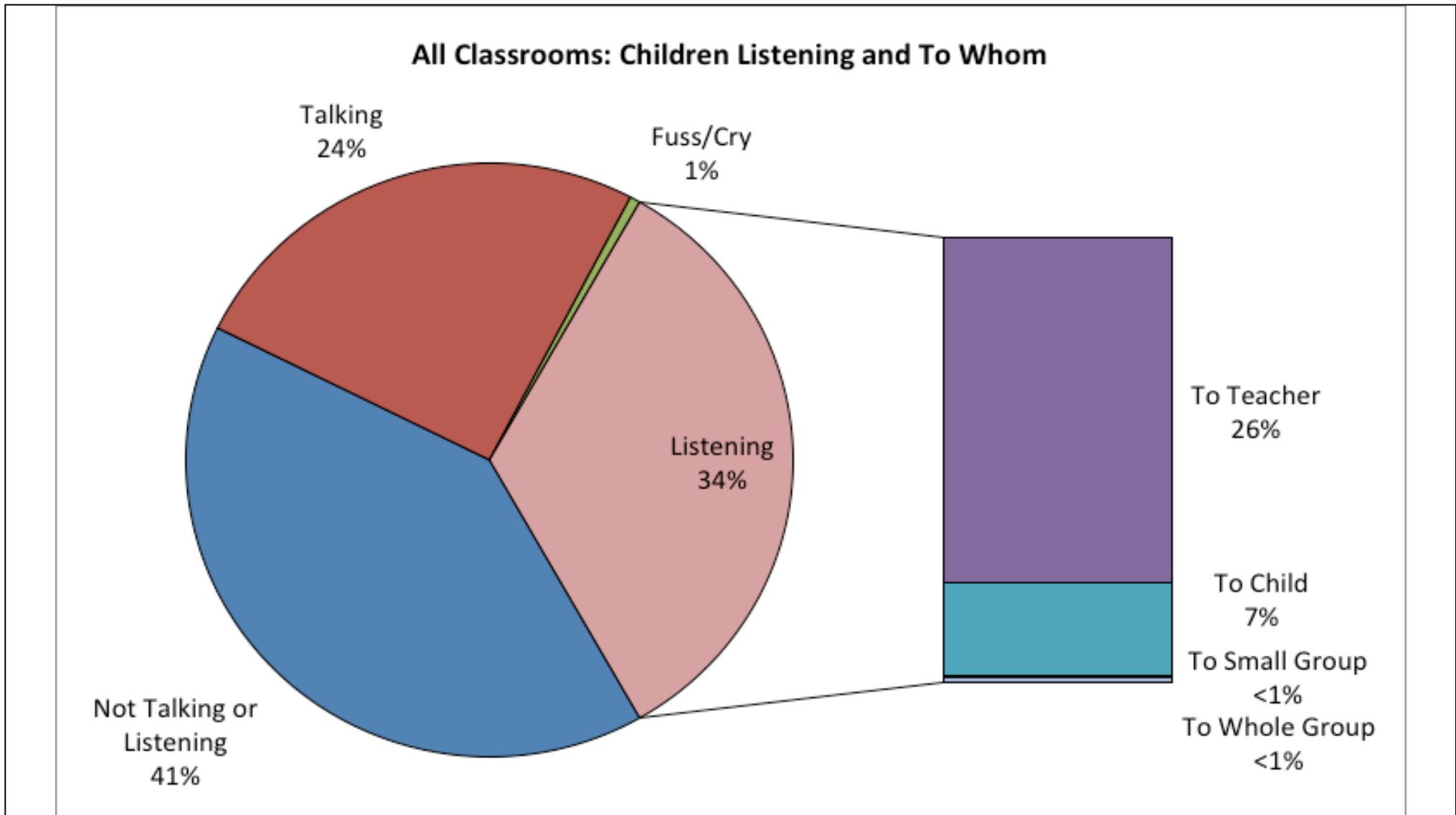
Children's Learning Focus
(during the 3.25 hour learning opportunity)

All Classrooms: Learning Focus

Literacy 9%
Language Arts 5%
Reading 8%
Math 6%
Science 5%
Social Studies 3%
Drama 4%
Other 23%
None 37%
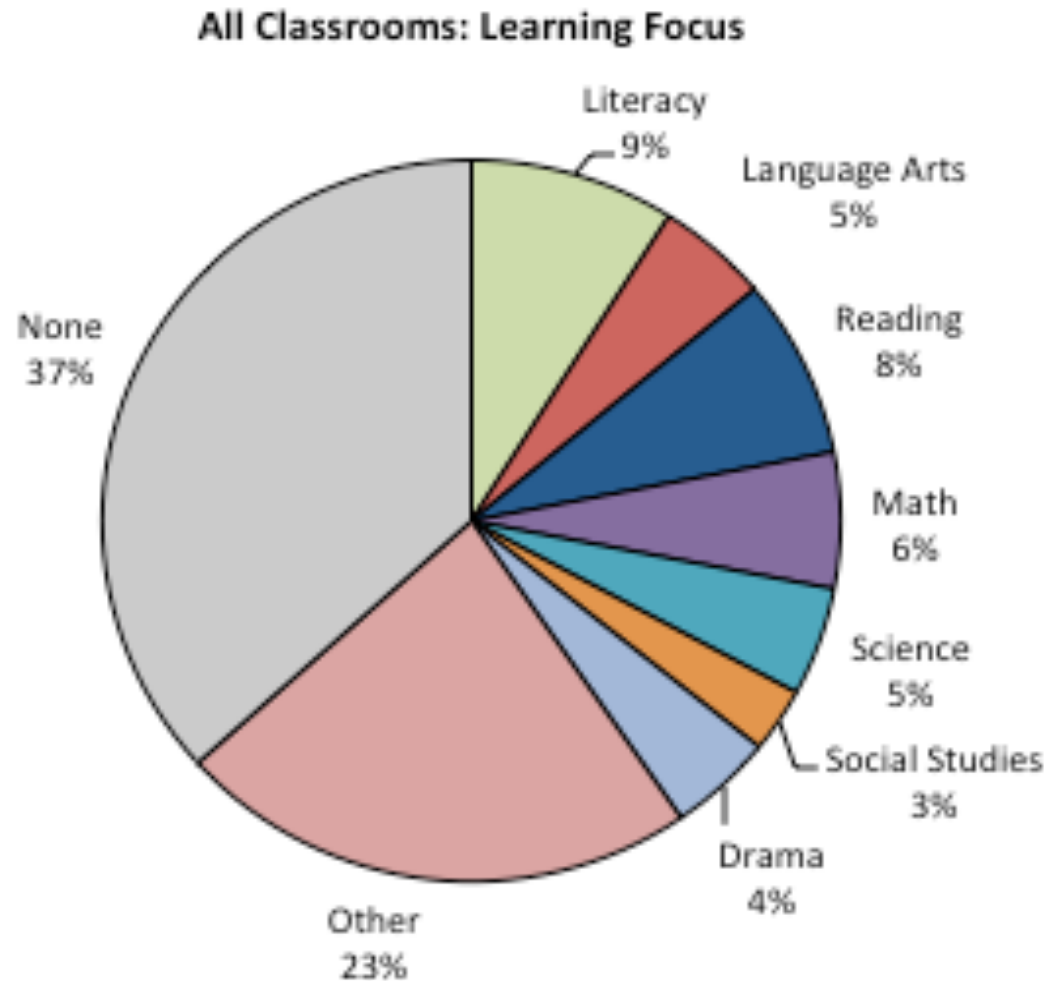
Classroom Predictors of Self-Regulation Gains: COP and TOP

Variable	Standardized Estimate	t-ratio	p
Emotional Climate (TOP)			
Behavior Approving	0.06	2.05	0.05
Behavior Disapproving	-0.05	-1.70	0.09
Emotional Tone	0.06	1.88	0.07
Quantity of Instruction			
Instruction as Delivered (from TOP)			
Math Focus	0.05	1.65	0.11
Literacy Focus	0.10	2.88	0.01
Language Arts Focus	0.03	0.75	0.46
Reading Focus	0.03	0.95	0.35
Instruction and Assessment	0.07	2.25	0.03
Transition	-0.04	-1.19	0.24
Instruction as Received (from COP)			
Math Focus	0.08	2.79	0.01
Literacy Focus	0.11	2.83	0.01
Language Arts Focus	0.07	2.09	0.04
Reading Focus	0.05	1.57	0.12
Level of Instruction (TOP)			
Overall Level of Instruction	0.06	2.00	0.05
Teacher and Child Talk/Listen (COP and TOP)			
Teacher Talk to Child	-.02	-.72	.48
Teacher Listening to Children	-0.03	-1.03	0.31
Children Listening to Teacher	.11	3.39	0.001
Children Talking to Self	-.06	-1.99	.05

Classroom Predictors of Achievement Gains: COP and TOP

Variable	Standardized Estimate	t-ratio	p
Emotional Climate (TOP)			
Behavior Approving	0.01	0.52	0.60
Behavior Disapproving	-0.07	-3.16	< .001
Emotional Tone	0.05	2.10	0.04
Quantity of Instruction			
Instruction as Delivered (from TOP)			
Math Focus	-0.01	-0.66	0.51
Literacy Focus	0.04	1.52	0.14
Language Arts Focus	0.05	1.97	0.05
Reading Focus	0.02	1.05	0.30
Instruction and Assessment	0.01	0.45	0.65
Transition	-0.01	-0.22	0.83
Instruction as Received (from COP)			
Math Focus	0.00	-0.09	0.93
Literacy Focus	0.05	1.50	0.14
Language Arts Focus	0.05	2.21	0.03
Reading Focus	0.00	0.03	0.98
Level of Instruction (TOP)			
Overall Level of Instruction	0.04	1.93	0.06
Teacher and Child Talk/Listen (COP and TOP)			
Teacher Talk to Child	-.02	-.83	.41
Teacher Listening to Children	1.00	0.54	0.59
Children Listening to Teacher	.03	.95	.35
Children Talking to Self	-.03	-1.42	.16

Summary: Specific Behavioral Processes

- Emotional Climate
  - More teacher behavior approving positively associated with self-regulation gains and more teacher behavior disapproving negatively associated with academic gains
  - Positive teacher average tone associated with greater academic gains
- Instructional Quantity
  - Greater proportion of instruction sweeps as well as mathematics and literacy sweeps associated with self-regulation gains
  - Greater proportion of language arts sweeps associated with both self-regulation and academic gains
- Level of Instruction
  - Higher levels of instruction associated with self-regulation gains
- Teacher and Child Talk
  - More children listening to teacher was associated with more self-regulation gains
  - More children talking to self was associated with less self-regulation gains

To Summarize

Achievement Gains

1. Less behavior disapproving by teacher
2. More positive teacher affect
3. More time in the classroom
4. More time in language arts
5. Higher teacher instruction level
6. Higher engagement levels overall and in literacy and reading

Self Regulation Gains

1. More behavior approving by teacher
2. Less behavior reminders by teacher
3. More teacher instruction
4. More time in mathematics, literacy, language arts
5. Higher teacher instruction level
6. Higher engagement levels overall and in reading
7. More children listening to teacher
8. Less self-talk

Discussion

- Replicated previous results suggesting associations between emotional climate, instructional quantity, and level of instruction and early academic gains

- Extended previous research and found associations among emotional climate, instructional quantity, level of instruction, and children listening/talking on early self-regulation gains
  - Behavior disapproving was particularly salient across measures as a predictor of less gains
  - TOP mathematics was a unique predictor of self-regulation gains and language was predictor of academic gains
  - More children listening to teacher and less self-talk associated with self-regulation gains

- Results suggest a role for the classroom environment in fostering self-regulation gains in addition to academic gains

Implications

- Teachers who show more positive affect in their teaching along with behavior approving may create an optimal environment for fostering both self-regulation and early academic skills

- Associations between time spent in academic activities and self-regulation (particularly mathematics) suggests a possible reciprocal relationship between children's academic and self-regulation development

- Results suggest possible avenues for intervention development either within a curriculum or independent of curriculum

Questions?

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