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The Digital Learning Classroom: Improving English Language Learners' Academic Success in 3rd and 5th Grade Mathematics

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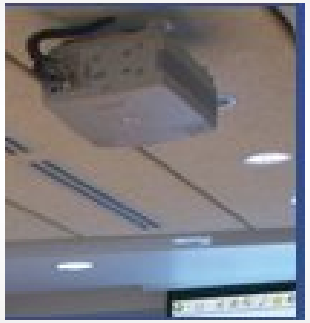
Digital Learning Classroom

- Round Rock School District Initiative
- Funded with Title I District Funds at estimated cost of $7,000 per classroom
- 3 Title I School-wide Elementary Schools
- 3rd and 5th Grade ELL Classrooms
- Traditional and Digital Learning Classrooms

Digital Learning Classroom:
Promethean Activclassroom Technology



Theoretical Framework: Five Principles of Effective Instructional Practice*

- Students' learning builds on their previous experiences.
- Students' learning takes place best in a social setting.
- Knowledge taught in a variety of contexts is more likely to support learning across students with diverse learning needs.
- Connected, organized and relevant information supports students learning of knowledge but also helps them develop higher-order thinking skills.
- Feedback and active evaluation of learning furthers students' understanding and skill development.

*National Research Council (2000). How People Learn: Brain, Mind, Experience, and School. Washington, DC: National Academy Press.

Evaluation Research Design and Methodology

- Quasi-Experimental Research Design
  - Comparison control group
  - Prior student's preparation based on district's benchmark test fall mid-semester administrations
- Methodology
  - Pass Rate Comparison
  - Chi-Square Test
  - Least Square Means t-Test

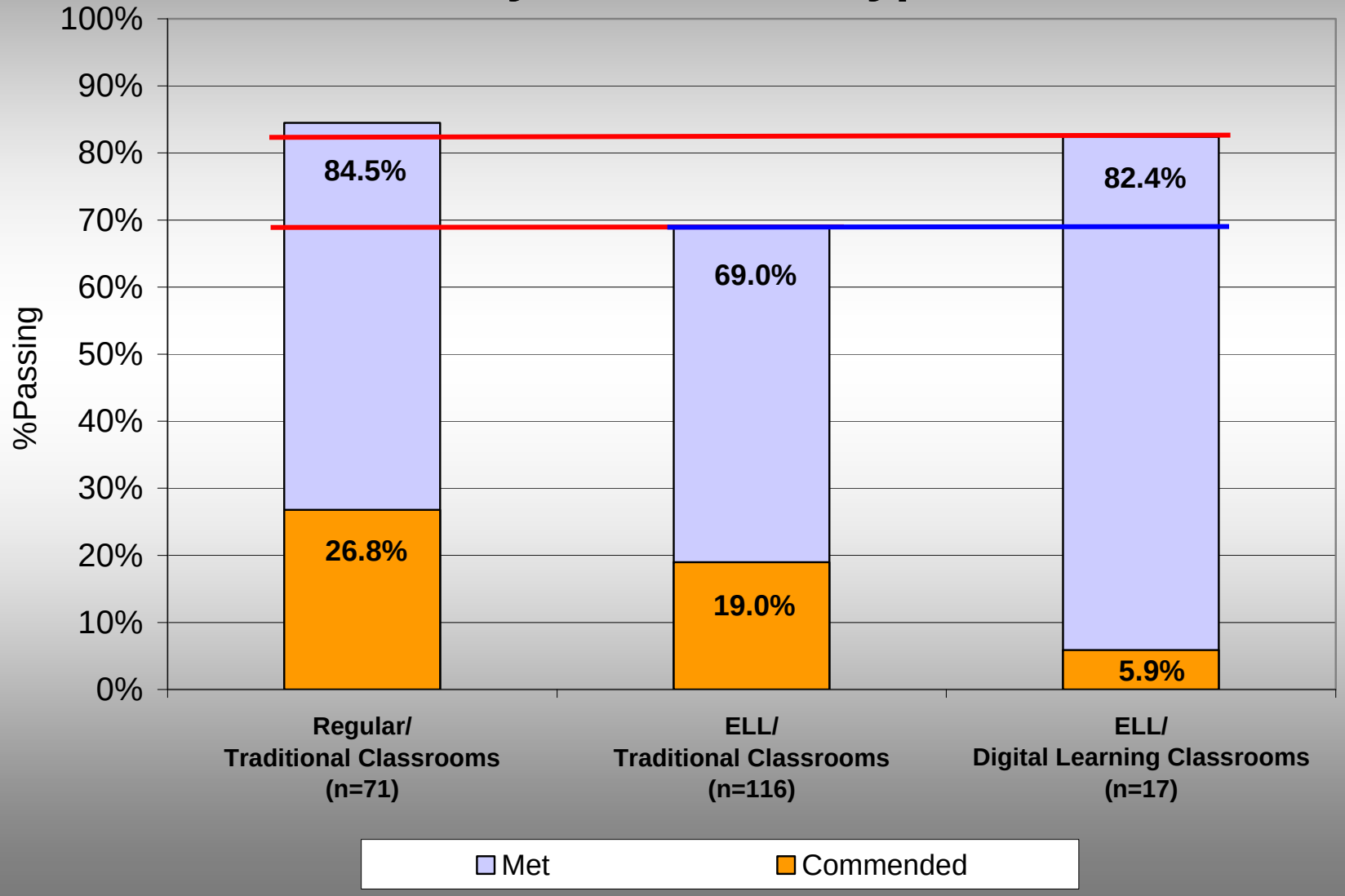
Students' Language Proficiency Levels by Classroom Type per Grade

Grade	Classroom Type	L1-Bilingual	L1-ESL	L2-M1	L2-M2	Non-ELL
3rd	Regular (n=71)/ Traditional Classrooms			1 (1.4%)		70 (98.6%)
	ELL (n=116)/ Traditional Classrooms	111 (95.7%)	5 (4.3%)			
	ELL (n=17)/ Digital Learning Classrooms	14 (82.4%)	3 (17.7%)			
5th	Regular (n=78)/ Traditional Classrooms			7 (9.0%)	9 (11.5%)	62 (79.5%)
	ELL (n=47)/ Traditional Classrooms	43 (91.5%)	4 (8.5%)			
	ELL (n=18)/ Digital Learning Classrooms	17 (94.4%)	1 (5.6%)			

Evaluation Research Questions

- Was performance parity achieved between ELL and regular students in traditional classrooms?
- Was performance parity achieved between ELL students in Digital Learning Classrooms and regular students in traditional classrooms?
- Did student achievement increase for ELL students in Digital Learning Classrooms compared to ELL students in traditional classrooms?

3rd Grade TAKS Pass Rates in Mathematics by Classroom Type

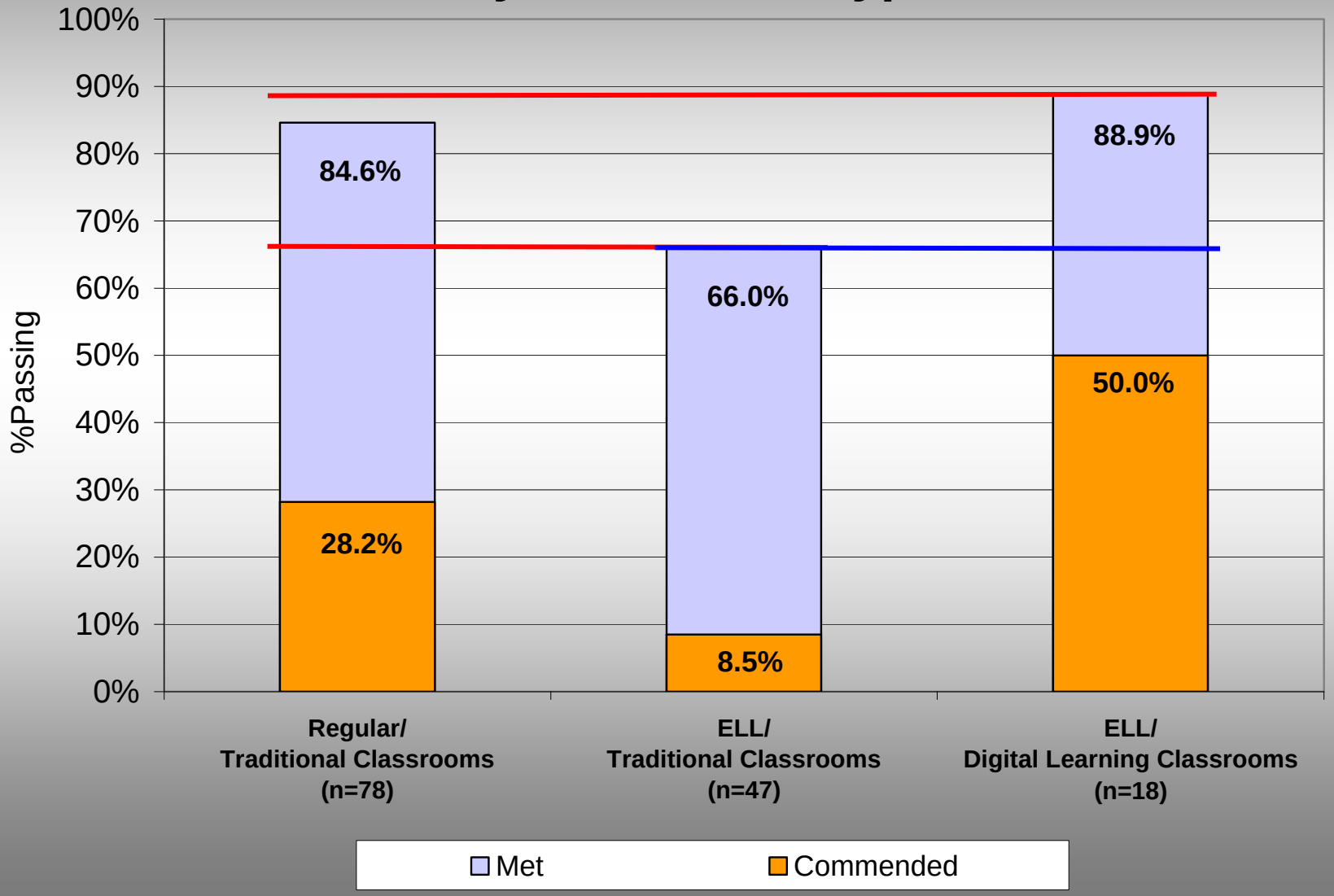


3rd Grade TAKS Mathematics Analysis Results

Analysis and Parameters	Performance Parity: ELL/Traditional Classrooms	Performance Parity: ELL/Digital Learning Classrooms	Performance Parity: ELL Increased Student Achievement
Pass Rate Comparison			
pELL(dlc) (n=17)		82.4%	82.4%
pELL(t) (n=116)	69.0%		69.0%
pRegular(t) (n=71)	84.5%	84.5%	
Difference	-15.5%	-2.1%	+13.4%
Performance Status	Disparity	Parity	Superior
Effect Size	-3.1	-0.4	+2.7
Chi-Square Test			
$\chi 2(df=1)$	5.6535	.0476	1.2822
p value	<0.0174	0.8273	0.2575
LS Means t-Test*			
μELL(dlc) [30.3]		2192.1	2192.1
μELL(t) [11.6]	2203.1		2203.1
μRegular(t) [14.9]	2243.5	2243.5	
μDifference	-40.4	-51.4	-11.0
Pr > |t| for H0: LS Means Equal	< 0.05	0.1294	0.7345

*Students in Analysis: 204; Model F Value: 88.2; Model F Significance: < .0001; R-Square: .570; Fall 2006 Mathematics Benchmark Mean: 61.4; Fall 2006 Mathematics Benchmark F Significance: < .0001; Classroom Type F Significance: .0739; 3rd Grade TAKS Mathematics Score Mean: 2216.2; Standard Error (SE) in brackets.

5th Grade TAKS Pass Rates in Mathematics by Classroom Type



5th Grade TAKS Mathematics Analysis Results

Analysis and Parameters	Performance Parity: ELL/Traditional Classrooms	Performance Parity: ELL/Digital Learning Classrooms	Performance Parity: ELL Increased Student Achievement
Pass Rate Comparison			
pELL(dlc) (n=18)		88.9%	88.9%
pELL(t) (n=47)	66.0%		66.0%
pRegular(t) (n=78)	84.6%	84.6%	
Difference	-18.6%	+4.3%	+22.9%
Performance Status	Disparity	Parity	Superior
Effect Size	-3.7	+0.9	+4.6
Chi-Square Test			
$\chi 2(df=1)$	5.8735	0.2144	3.4180
p value	<0.0154	0.6433	0.0645
LS Means t-Test*			
μELL(dlc) [35.6]		2207.7	2207.7
μELL(t) [21.3]	2178.6		2178.6
μRegular(t) [16.4]	2275.1	2275.1	
μDifference	-96.5	-67.4	+29.1
Pr > |t| for H0: LS Means Equal	< 0.001	0.0893	0.4911

Number of Students in Analysis: 143; Model F Value: 63.3; Model F Significance: < .0001; R-Square: .578;
Fall 2006 Mathematics Benchmark Mean: 63.0; Fall 2006 Mathematics Benchmark F Significance: < .0001;
Classroom Type F Significance: < .01; TAKS Score Mean: 2234.9;
Standard Error (SE) in brackets.

Was performance parity achieved between ELL and regular students in traditional classrooms?

Grade/TAKS Subject Areas	TAKS Met Pass Rate Comparison	Chi-Square Test*	LS Means t-Test*
3rd Grade TAKS Mathematics	No	No	No
5th Grade TAKS Mathematics	No	No	No

*Statistical significance at p<.05 level.

Was performance parity achieved between ELL students in Digital Learning Classrooms and regular students in traditional classrooms?

Grade/TAKS Subject Areas	TAKS Met Pass Rate Comparison	Chi-Square Test*	LS Means t-Test*
3rd Grade TAKS Mathematics	Yes	Yes	Yes
5th Grade TAKS Mathematics	Yes	Yes	Yes

*Statistical significance at $p<.05$ level.

Did student achievement increase for ELL students in Digital Learning Classrooms compared to ELL students in traditional classrooms?

Grade/TAKS Subject Areas	TAKS Met Pass Rate Comparison	Chi-Square Test*	LS Means t-Test*
3rd Grade TAKS Mathematics	Yes	No	No
5th Grade TAKS Mathematics	Yes	No***	No

*Statistical significance at p<.05 level.

**Pass Rate Comparison result was validated by chi-square at p<.10 level.

Inferences and Conclusions

- Implications for ELL Students
- Lessons Learned
- Future Research

Questions and Comments

Inquires regarding the content of this presentation can be directed to:

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