



Evaluating the Impact of TDOE's Early Reading Training on the **2023–2024** TN-URS Performance in Grades K–3

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TENNESSEE READING
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Background

Since the 2021 Tennessee Literacy Success Act (TLSA) was enacted, the Tennessee Department of Education (TDOE) has been supporting educators in meeting the requirements for increased knowledge and implementation of scientifically based reading instruction. To monitor the success of their efforts, the TDOE has commissioned a series of evaluations examining the impact that teachers' participation in different types and combinations of early literacy professional development has had on their students' reading performance. The first and second reports addressed the outcomes of the initial kindergarten through Grade 1 (Grades K–1) cohorts of students who were beginning their formal reading instruction during the 2021–2022 and 2022–2023 school years, respectively. These represented Years 1 and 2 of implementing the statewide Early Reading Training (ERT) courses.

The evaluations of the initial cohorts revealed that ERT participation had a significantly positive impact on K–1 students' performance on the Tennessee Universal Reading Screener (TN-URS). The current report extends upon the earlier findings by examining the outcomes of students in Grades K–3 in the 2023–2024 school year. In addition to including a wider range of grade levels, the Year 3 evaluation differed from those in Years 1 and 2 because there was no longer a control group of teachers who would not have had a minimum level of foundational literacy skills knowledge.

Professional Development Groups (PD Groups)

The TLSA required all elementary educators to complete Course 1 of ERT, complete an approved alternative foundational literacy skills course, or demonstrate equivalent knowledge on a test of those skills by August 1, 2023. The TDOE offered ERT Course 1 and ERT Course 2 at no cost to educators across the state.

Educators who had completed a comparable foundational literacy course could request a review to determine whether it met TLSA requirements. Courses that were reviewed and approved by the department were recognized as approved alternative foundational literacy skills courses. Educators who completed ERT Course 1 had the option of continuing to ERT Course 2, which focused on applying their knowledge to preparing lessons using high-quality instructional materials. Therefore, at the start of the 2023–2024 school year, teachers could be classified into three groups based on how they satisfied the TLSA requirement:

- **Other Professional Development (Other PD):** Completed an approved alternative course or passed a test of foundational literacy skills knowledge
- **ERT Course 1:** Completed the 30-hour, knowledge-based ERT Course 1 and passed the summative test with an 80% or better score
- **ERT Courses 1 + 2:** Completed both the 30-hour, knowledge-based ERT Course 1 and an additional 30 hours, application-based ERT Course 2 with a summative performance task

Teachers were considered to have completed ERT Course 1 or 2 for the 2023–2024 school year if they had finished all components by December 31, 2023. The ERT and alternative trainings were not the only supports for teachers to learn about and implement effective early literacy instruction. Every year, the TDOE offered other statewide learning opportunities, and schools were required to implement foundational literacy skills plans. Moreover, school leaders received support in monitoring the early literacy instruction in their buildings and using professional learning communities to foster ongoing learning, and educator preparation programs were required to meet new literacy standards in training future teachers. Consequently, the evaluation in Year 3 could only assess the value added by ERT courses specifically within the statewide environment of increased professional learning across all sectors.

Purpose

To evaluate the role that participation in ERT courses might have on students' literacy performance in the 2023–2024 school year, the primary aim of the present analyses was to compare the universal reading screener (URS) scores of K–3 students who were taught by participants in one or both ERT courses with the students of teachers who fulfilled the TLSA requirement with another form of professional development. The comparisons were between different treatments because there was no control group of teachers who could be said to have no training in foundational literacy skills.

Students

The TLSA requires one of seven approved URS instruments to be administered to all students in Grades K–3, but the sample was limited to those who had completed the TN-URS. This was because all instruments have slight variations in what skills were assessed and how their composite scores were determined. The state financially supported the TN-URS, and it was adopted by the greatest number of districts. Therefore, it was considered the most relevant outcome for measuring student learning consistent with how the TLSA was enacted. Statewide data were obtained on the full sample of K–3 students with a composite score from both the fall and spring administrations. The composite score is provided in a percentile rank ranging from 1 to 99. The 50th percentile represents the normative mean performance, and the 41st percentile was the state-established cut point for proficient reading ability. In addition, the dataset was limited to those K–3 students who had an identified teacher of record with corresponding licensure information in Tennessee.

Analytic Approach

After limiting the statewide database to K–3 students who were administered the TN-URS, there were different numbers of districts with usable data, depending on the grade level. Of the 147 public school districts in the state, 101 districts remained in the kindergarten dataset, 102 districts in Grade 1, 98 in Grade 2, and 129 in Grade 3. From the TN-URS sample, students were removed if they were missing test data, demographics, or teachers of record with corresponding licensure information. Restricting the analyses to cases with complete student- and teacher-level data resulted in removing several thousand students in each grade (K $n = 7,303$ students removed; Grade 1 $n = 7,567$; Grade 2 $n = 7,492$; Grade 3 $n = 14,311$).

Each remaining student was classified by their teacher's PD group. Table 1 provides the counts of teachers and their students by PD group. The two ERT training groups were each compared to the Other PD group to determine the value of participating in the state training specifically. The group label of "Other PD" was used to represent that all teachers had participated in some form of TDOE-approved training or demonstration of equivalent knowledge by August 1, 2023, as the TLSA required.

Table 1*2023–2024 Distribution of Teachers and Students Across the Professional Development Groups*

Participant Group	Other PD	ERT Course 1	ERT Courses 1 + 2	Total
Kindergarten				
Teachers	156	432	666	1,254
Students	2,288	6,467	10,310	19,065
Grade 1				
Teachers	187	439	647	1,273
Students	2,870	6,924	9,856	19,650
Grade 2				
Teachers	155	426	609	1,190
Students	2,455	6,746	9,809	19,010
Grade 3				
Teachers	196	543	383	1,122
Students	3,483	10,630	7,990	22,103

Note. The counts of students in the table reflect only the data from districts administering the TN-URS. The counts of teachers in the table were based on ERT course completions by December 31, 2023.

The TN-URS is administered three times per year: fall, winter, and spring. The fall 2023 scores were used to control for baseline performance, and the spring 2024 scores were used for determining the outcomes of being taught by teachers classified in the different PD groups.

Student demographics are presented by grade and teacher PD group in Table 2. Given the variations in the compositions of the different PD groups, we applied a statistical procedure called “propensity score weighting” to equate the groups in each grade level before conducting the outcome analysis (see the Technical Appendix for a full description).

Table 2
K–3 Students’ Demographics

Teacher PD Group	Female	White	BHM	Sped	EconD	ML
Kindergarten						
Other PD	1,099	1,868	724	372	650	238
ERT Course 1	3,128	5,649	1,634	958	1,619	683
ERT Courses 1 + 2	5,052	9,095	2,251	1,648	3,105	741
Grade 1						
Other PD	1,450	2,367	809	455	784	328
ERT Course 1	3,365	5,946	1,783	1,171	1,652	682
ERT Courses 1 + 2	4,774	8,727	2,230	1,835	2,923	785
Grade 2						
Other PD	1,191	2,118	598	454	686	210
ERT Course 1	3,294	5,765	1,800	1,284	1,665	692
ERT Courses 1 + 2	4,874	8,696	2,166	1,856	2,738	720
Grade 3						
Other PD	1,716	2,358	962	611	899	218
ERT Course 1	5,225	7,455	2,728	1,728	2,515	561
ERT Courses 1 + 2	3,890	5,995	1,826	1,426	2,460	414

Note. BHM = students identified as Black, Hispanic, and/or Native American; Sped = students receiving special education services; EconD = students identified as economically disadvantages; ML = students identified as multilingual learners.

In analyzing students' Spring 2024 TN-URS outcomes, students' Fall 2023 TN-URS scores were included as covariates along with characteristics previously found to be associated with student performance (i.e., identification as Black, Hispanic, or Native American [BHN]; special education status; economic disadvantage; and multilingual learner status). Details of the doubly robust, multilevel modeling procedures are provided in the Technical Appendix.

2023–2024 Results

The Estimate column in Table 3 shows the average fall-to-spring composite score increase in percentile ranks after controlling for baseline TN-URS performance and relevant student demographics (i.e., BHN, special education, economic disadvantage, multilingual learner). The results for the student covariates are not displayed in Table 3, but results indicated that—in every grade level—they were statistically significantly related to student outcomes. Specifically, higher fall scores were associated with higher fall-to-spring growth, and identification in any of the included demographic categories was associated with slower growth.



Table 3*Professional Development Group Comparisons of Spring 2024 TN-URS Scores in Grades K–3*

Teacher PD Group	Estimate	Std. Error	t-value	p-value
Kindergarten				
Other PD	26.160	2.249	11.630	<0.001
ERT Course 1 vs. Other PD	3.890	2.123	1.832	0.070
ERT Courses 1 + 2 vs. Other PD	4.480	2.325	1.927	0.057
Grade 1				
Other PD	16.837	1.134	14.851	<0.001
ERT Course 1 vs. Other PD	1.934	1.022	1.892	0.062
ERT Courses 1 + 2 vs. Other PD	2.217	0.917	2.417	0.018
Grade 2				
Other PD	14.610	1.322	11.055	<0.001
ERT Course 1 vs. Other PD	1.053	0.762	1.382	0.170
ERT Courses 1 + 2 vs. Other PD	1.518	0.735	2.067	0.042
Grade 3				
Other PD	11.291	0.927	12.184	<0.001
ERT Course 1 vs. Other PD	0.780	0.634	1.231	0.221
ERT Courses 1 + 2 vs. Other PD	1.393	0.667	2.088	0.040

Note. Bolded results for the professional development groups indicate significant differences.

The ERT Course 1 and ERT Courses 1 + 2 rows show the number of percentile ranks the average composite score increased above the average score increase shown in the rows for the Other PD group. If the differences were statistically significant, the values in the row are bolded. In all grade levels, there were no statistically significant differences observable between students whose teachers had completed ERT Course 1 or another approved means of satisfying the TLISA requirement. This suggests the state was successful in raising the minimum foundational literacy skills knowledge of its K–3 educators, regardless of how the educators met that requirement.

In kindergarten, teachers' participation in the additional 30 hours of ERT Course 2 training (after completing ERT Course 1) did not make a statistically significant difference in students' performance. However, ERT Course 2 participation did make a statistically significant difference in the TN-URS growth of students in Grades 1–3. This is consistent with the previous evaluations that suggested as students mature and accumulate exposure to TLISA components, their teachers benefit from ERT Course 2 training in how to apply their foundational literacy skills knowledge to the intellectual preparation for and delivery of classroom reading instruction.

Because there were significant differences in teacher characteristics before propensity score weighting, key characteristics (i.e., months of experience, education level, level of effectiveness, and reading specialist endorsement) were analyzed to determine the extent to which they moderated student outcomes. The results suggested no clear pattern of relationship.



Summary of 2023–2024 Evaluation

In the [first year](#) of implementing ERT (2021–2022), only ERT Course 1 demonstrated a statistically significant impact on the TN-URS performance of at-risk readers in Grades K–1. ERT Course 1 remained significant to the overall performance of K–1 students in the [second year](#) of implementing ERT (2022–2023). However, adding ERT Course 2 surfaced as a stronger contributor to TN-URS outcomes as students progressed in ability and grade. This largely held in the third year of implementing ERT (2023–2024). Specifically, participation in ERT Courses 1 and 2 was associated with statistically significantly higher Spring 2024 TN-URS performance across Grades 1–3 compared to Other PD, whereas ERT Course 1 was no longer significantly associated with student outcomes in any of Grades K–3. The Year 3 results are summarized broadly in Table 4.

Table 4
Overview of Results

Kindergarten	
ERT Course 1 vs. Other PD	Not Significant
ERT Courses 1 + 2 vs. Other PD	Not Significant
Grade 1	
ERT Course 1 vs. Other PD	Not Significant
ERT Courses 1 + 2 vs. Other PD	Significant
Grade 2	
ERT Course 1 vs. Other PD	Not Significant
ERT Courses 1 + 2 vs. Other PD	Significant
Grade 3	
ERT Course 1 vs. Other PD	Not Significant
ERT Courses 1 + 2 vs. Other PD	Significant

The TLSA required all elementary educators to complete ERT Course 1 or its approved equivalent by August 1, 2023, so there was no group in the Year 3 evaluation that did not have the minimum expected knowledge of foundational literacy skills. ERT Course 1 provided about 30 hours of training in this base-level knowledge, which is the optimal amount of training identified in a meta-analysis (Basma & Savage, 2019). Although the meta-analysis found diminishing returns of training beyond 30 hours, there are elements that might have contributed to the value of the additional ERT Course 2 evident in the Year 2 and Year 3 evaluations.

First, ERT Course 2 was designed for application-based learning to assist educators in using student data and their high-quality instructional materials to prepare effective literacy instruction. Previous research findings suggest that combining knowledge with opportunities to apply that knowledge is most beneficial for creating meaningful changes in teacher practice (Sims et al., 2023). Second, there typically was a delay between completing the two ERT courses. That is because, in 2023, ERT Course 1 was offered asynchronously and had to be completed before educators could participate in ERT Course 2, which was only offered as a face-to-face session in the summer of 2023. Thus, participants were not receiving the full 60 hours in a single, extended session and would have had time to process the knowledge they learned in ERT Course 1 before working on applying it in ERT Course 2.

Finally, Grades 1–3 students in 2023–2024 could have experienced multiple years of literacy instruction from teachers who had participated in the professional development offerings being offered in numerous forms. Hence, a meaningful difference in Grades 1–3 student performance might be anticipated only after teachers participated in the targeted professional learning of ERT Course 2. By contrast, kindergarteners still were experiencing formal literacy instruction for the first time, so the benefits of ERT Course 2 might be harder to detect until the children have accumulated more exposure to the minimally expected literacy instruction.

By Year 3 of implementing the TLSA, teachers across the state were achieving a higher threshold level of knowledge than in the years prior to 2021, creating a more equivalent basic experience for K–3 students. That was a goal of the legislation, and the results of this evaluation indicate it was being accomplished. To continue that momentum, educators and leaders can consider taking the following steps to further strengthen instructional practices and student literacy outcomes.

State Leaders

- As the threshold level of foundational literacy knowledge is met, provide professional learning that deepens educators' understanding of more advanced literacy skills and concepts, supporting continued growth in instructional expertise and student learning.
- Given that ERT Course 2 has moved online, consider ways to ensure that completion of ERT courses is distributed over time.
- Provide opportunities for districts to collaborate around literacy instruction, drawing on successful practices from peers and creating space for shared problem solving and cross-district learning.
- Provide a range of professional learning models—including in-person, virtual, and asynchronous options—that extend beyond foundational literacy skills and build a robust knowledge base for systems-level change, including district structures and clearly defined roles and responsibilities.
- Provide support to districts in developing a coherent system of learning that spans the full instructional day, ensuring strong connections between core instruction and intervention. This should include structures that promote educator collaboration and enable the sharing of knowledge gained through state-level professional learning.

District and School Leaders

- Use the Cycle of Continuous Improvement consistently to move educators beyond the minimum knowledge of foundational literacy skills and advance their abilities to meet students' ever-changing needs.
- Demonstrate the importance of early literacy instruction by conducting learning walks with the Foundational Skills Instructional Practice Guides (IPGs) and provide high-quality feedback for how to refine implementation of effective practices and better meet individual student needs.
- Ensure that professional learning communities foster collaborative use of student data and high-quality instructional materials to prepare effective literacy lessons.
- Provide district and school professional learning that is responsive to student and teacher data, and ensure that insights and strategies from state-level professional learning are shared with educators to strengthen instruction statewide.

- Create school schedules that provide common planning time for grade-level teams, as well as scheduled collaboration time for all educators who support those students—including interventionists, tutors, special education staff, and English language teachers—to internalize lessons and use student data to inform instruction.
- Create a strong structure for preparing new teachers and transferring educators from other states by providing professional learning on evidence-based instructional practices, expectations for using high-quality instructional materials, and effective use of student data to ensure all students receive equitable learning opportunities.

Educators

- Participate in ongoing professional learning opportunities, including ERT Course 2, to refine the application of foundational literacy skills knowledge in preparing and delivering lessons with high-quality instructional materials.
- Use your classroom data to make informed decisions about forming small groups and tailoring instruction to meet individual student needs. Consider how these data trends also can guide the professional learning you may need to strengthen your ability to provide targeted, responsive instruction.
- Engage in routine intellectual preparation with grade-level teams and student support educators to discuss upcoming lessons, understand the lesson goals, and examine how each lesson fits within the broader scope and sequence of the unit and school year.
- Seek out targeted resources or professional learning opportunities to strengthen areas where additional support is needed. Leverage your school leaders, instructional coaches, district leadership, and state partners to identify and access these supports.

Community Organizations

- If providing literacy support to children in out-of-school programs, work with the feeder schools to ensure coherence with the district's state-approved instructional materials and skills and practices being implemented during core instruction.
- Use the [review tool](#) available from the Tennessee Reading Research Center to check the alignment of K–1 literacy materials with research on code-focused instruction.
- Ensure all tutors receive consistent training so students experience aligned, high-quality instruction grounded in best practices. TN ALL Corps training resources can be found [here](#).

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Technical Appendix

Propensity Score Analysis

The analytic dataset consisted of students nested within teachers, who were nested within schools and districts. Treatment was defined at the teacher level with teacher participation in one of three professional development (PD) conditions (Other PD, ERT Course 1, or ERT Courses 1 + 2). Outcomes were measured at the student level as student performance on the Spring TN-URS administration. Because assignment to the groups was not random, propensity score weighting was applied to equate the PD treatment groups.

Weighting can include all participants, whereas propensity score matching would eliminate participants from the groups if their characteristics could not be matched. The propensity score model was estimated at the level of treatment assignment (teacher level), using teacher and aggregated classroom covariates to make the PD groups more similar to each other without eliminating data (Gómez et al., 2023; Nickodem, 2020).

As in cluster-level treatment designs, only confounders of treatment selection at the cluster or higher levels are relevant (Leite, 2017). Therefore, the teacher covariates included months of teaching experience, license type, level of effectiveness scale score, education level, teaching endorsements, biological sex, and race/ethnicity. The classroom covariates included the aggregated student characteristics of economic disadvantage, multilingual learner status, BHN, and special education status.

The generalized propensity scores (GPS) for the multi-treatment groups were estimated using generalized boosted modeling (GBM; McCaffrey et al., 2004; Ridgeway et al., 2022). Inverse probability of treatment weights (IPTW) were estimated and normalized at the teacher level, and these teacher-level weights were then applied to the student-level data.

Table A1 shows the 2023–2024 distributions of K–3 students in the treatment and control groups before and after propensity score weighting. Covariate balance before and after weighting was assessed using standardized mean differences. Absolute standardized mean difference (ASMD) values below 0.2 after weighting were indicative of acceptable balance on the measured covariates (Harder et al., 2010; Stuart, 2010; Stuart et al., 2013).

Table A1

2023–2024 Distribution of Grades K–3 Students in the Treatment and Control Groups Before and After Propensity Score Weighting

Comparison	Covariates	Before Propensity Score Weighting			After Propensity Score Weighting		
		Treated Mean	Control Mean	ASMD	Treated Mean	Control Mean	ASMD
Full Sample of Kindergarten Students (N = 19,065)							
Other PD vs. ERT Course 1	TN-URS	33.94	35.897	0.069	33.351	35.213	0.067
	Economically Disadvantaged	0.284	0.250	0.076	0.282	0.273	0.020
	BHN	0.316	0.253	0.142	0.250	0.235	0.034
	Special Ed	0.163	0.148	0.040	0.168	0.156	0.032
	Multilingual Learner	0.104	0.106	0.005	0.070	0.087	0.063
Other PD vs. ERT Courses 1 + 2	TN-URS	33.94	34.292	0.013	33.351	34.632	0.047
	Economically Disadvantaged	0.284	0.301	0.038	0.282	0.288	0.013
	BHN	0.316	0.218	0.223	0.250	0.229	0.049
	Special Ed	0.163	0.160	0.007	0.168	0.156	0.032
	Multilingual Learner	0.104	0.072	0.114	0.070	0.075	0.019
ERT Course 1 vs. ERT Courses 1 + 2	TN-URS	35.897	34.292	0.057	35.213	34.632	0.021
	Economically Disadvantaged	0.250	0.301	0.114	0.273	0.288	0.033
	BHN	0.253	0.218	0.081	0.235	0.229	0.015
	Special Ed	0.148	0.160	0.032	0.156	0.156	0.000
	Multilingual Learner	0.106	0.072	0.119	0.087	0.075	0.044

Note. TN-URS = the Tennessee universal reading screener; BHN = students identified as Black, Hispanic, and/or Native American; ASMD = Absolute standardized mean difference.

Table A1, cont.

2023–2024 Distribution of Grades K–3 Students in the Treatment and Control Groups Before and After Propensity Score Weighting

Comparison	Covariates	Before Propensity Score Weighting			After Propensity Score Weighting		
		Treated Mean	Control Mean	ASMD	Treated Mean	Control Mean	ASMD
Full Sample of Grade 1 Students (N = 19,650)							
Other PD vs. ERT Course 1	TN-URS	36.291	35.158	0.036	37.001	33.808	0.102
	Economically Disadvantaged	0.273	0.239	0.079	0.260	0.260	0.001
	BHN	0.282	0.258	0.055	0.210	0.241	0.073
	Special Ed	0.159	0.169	0.029	0.170	0.171	0.003
	Multilingual Learner	0.114	0.098	0.051	0.079	0.089	0.034
Other PD vs. ERT Courses 1 + 2	TN-URS	36.291	31.478	0.155	37.001	32.406	0.148
	Economically Disadvantaged	0.273	0.030	0.052	0.260	0.273	0.030
	BHN	0.282	0.226	0.128	0.210	0.228	0.042
	Special Ed	0.159	0.186	0.073	0.170	0.182	0.031
	Multilingual Learner	0.114	0.080	0.117	0.079	0.082	0.012
ERT Course 1 vs. ERT Courses 1 + 2	TN-URS	35.158	31.478	0.119	33.808	32.406	0.046
	Economically Disadvantaged	0.239	0.297	0.131	0.260	0.273	0.029
	BHN	0.258	0.226	0.073	0.241	0.228	0.031
	Special Ed	0.169	0.186	0.045	0.171	0.182	0.027
	Multilingual Learner	0.098	0.080	0.066	0.089	0.082	0.022

Note. TN-URS = the Tennessee universal reading screener; BHN = students identified as Black, Hispanic, and/or Native American; ASMD = Absolute standardized mean difference.

Table A1, cont.

2023–2024 Distribution of Grades K–3 Students in the Treatment and Control Groups Before and After Propensity Score Weighting

Comparison	Covariates	Before Propensity Score Weighting			After Propensity Score Weighting		
		Treated Mean	Control Mean	ASMD	Treated Mean	Control Mean	ASMD
Full Sample of Grade 2 Students (N = 19,010)							
Other PD vs. ERT Course 1	TN-URS	42.869	43.961	0.038	42.191	43.748	0.054
	Economically Disadvantaged	0.279	0.247	0.074	0.273	0.255	0.042
	BHN	0.244	0.267	0.053	0.243	0.237	0.015
	Special Ed	0.185	0.190	0.014	0.193	0.188	0.012
	Multilingual Learner	0.086	0.103	0.058	0.076	0.086	0.037
Other PD vs. ERT Courses 1 + 2	TN-URS	42.869	40.985	0.066	42.191	41.208	0.035
	Economically Disadvantaged	0.279	0.279	0.001	0.273	0.275	0.004
	BHN	0.244	0.221	0.054	0.243	0.236	0.015
	Special Ed	0.185	0.189	0.011	0.193	0.184	0.022
	Multilingual Learner	0.086	0.073	0.045	0.076	0.084	0.028
ERT Course 1 vs. ERT Courses 1 + 2	TN-URS	43.961	40.985	0.104	43.748	41.208	0.089
	Economically Disadvantaged	0.247	0.279	0.073	0.255	0.275	0.046
	BHN	0.267	0.221	0.107	0.237	0.236	0.000
	Special Ed	0.19	0.189	0.003	0.188	0.184	0.010
	Multilingual Learner	0.103	0.073	0.103	0.086	0.084	0.009

Note. TN-URS = the Tennessee universal reading screener; BHN = students identified as Black, Hispanic, and/or Native American; ASMD = Absolute standardized mean difference.

Table A1, cont.

2023–2024 Distribution of Grades K–3 Students in the Treatment and Control Groups Before and After Propensity Score Weighting

Comparison	Covariates	Before Propensity Score Weighting			After Propensity Score Weighting		
		Treated Mean	Control Mean	ASMD	Treated Mean	Control Mean	ASMD
Full Sample of Grade 3 Students (N = 22,103)							
Other PD vs. ERT Course 1	TN-URS	46.011	48.363	0.082	45.407	47.272	0.066
	Economically Disadvantaged	0.258	0.237	0.050	0.259	0.257	0.005
	BHN	0.276	0.257	0.044	0.267	0.252	0.035
	Special Ed	0.175	0.163	0.034	0.177	0.168	0.023
	Multilingual Learner	0.063	0.053	0.042	0.064	0.051	0.055
Other PD vs. ERT Courses 1 + 2	TN-URS	46.011	43.995	0.072	45.407	45.57	0.006
	Economically Disadvantaged	0.258	0.308	0.111	0.259	0.277	0.040
	BHN	0.276	0.229	0.110	0.267	0.235	0.075
	Special Ed	0.175	0.178	0.008	0.177	0.173	0.010
	Multilingual Learner	0.063	0.052	0.046	0.064	0.053	0.045
ERT Course 1 vs. ERT Courses 1 + 2	TN-URS	48.363	43.995	0.156	47.272	45.57	0.061
	Economically Disadvantaged	0.237	0.308	0.161	0.257	0.277	0.045
	BHN	0.257	0.229	0.066	0.252	0.235	0.040
	Special Ed	0.163	0.178	0.042	0.168	0.173	0.013
	Multilingual Learner	0.053	0.052	0.004	0.051	0.053	0.009

Note. TN-URS = the Tennessee universal reading screener; BHN = students identified as Black, Hispanic, and/or Native American; ASMD = Absolute standardized mean difference.

Main Effect Analysis

After confirming the groups were balanced by the covariates, models were estimated to compare the Spring TN-URS composite scores of students taught by educators in the different PD treatment groups. Recall that the analyses focused on determining whether participation in the ERT course offerings benefited students' TN-URS performance more than approved alternative means of meeting the TLSA requirement for teachers' minimum foundational literacy skills knowledge. Treatment effects were estimated using a doubly robust approach and the outcome analyses were conducted using survey-weighted generalized linear models, with clustering accounted for at the district, school, and teacher levels and standard errors estimated via Taylor series linearization to account for the nested structure and unequal weights (Leite, 2017; Lumley, 2010).





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