Effects of PLC at Work in Arkansas on Student Academic Outcomes

This study evaluates the impact of Solution Tree’s Professional Learning Communities (PLC) at Work model on the academic achievement and growth of students in Arkansas schools. It provides the first large-scale evaluation of the PLC at Work model’s effectiveness in improving student academic outcomes. Using publicly available data from the Arkansas Department of Education (ADE), the analysis uses a two-stage matching process and an event study framework to determine the effectiveness of PLC at Work across six cohorts. The findings hold significant implications for policymakers, educators, and researchers interested in leveraging professional development to enhance educational practices and student outcomes.

Overall, we find no statistically significant impacts on student achievement or value-added growth, suggesting that the PLC at Work model may not improve academic outcomes for Arkansas students.

Introduction

Professional Learning Communities (PLCs) have gained significant traction as a model for professional development within the educational landscape. PLCs are a collaborative approach to professional development for educators that focuses on improving student learning outcomes through collective inquiry and action research. They differ from traditional professional development programs by being more comprehensive and school wide.

In 2017, Arkansas embarked on an initiative to partner with Solution Tree to implement the PLC at Work model statewide. Funding through Act 427 supported this initiative, aiming to enhance teacher collaboration and improve student outcomes through a structured professional development framework in selected Arkansas schools. The Arkansas Division of Elementary and Secondary Education oversees the initiative, providing resources, training, and support to participating schools.

The PLC at Work program is intensive. Arkansas’s PLC at Work initiative currently includes 90 schools selected through an application and evaluation process. Each school selected to be a PLC at Work partner receives up to 50 days annually of on-site professional development delivered by certified Solution Tree associates and a certified Solution Tree PLC at Work Associate or Site Coach to coordinate program implementation over a three-year period.
Arkansas Context
This study, conducted in partnership with DESE, examines the relationship between implementing PLCs and increased student performance on standardized assessments for all ninety PLC at Work schools in Arkansas, with student outcomes for up to five years after selection. We leverage publicly available data from the ADE Data Center, including student achievement scores and value-added growth measures, to investigate the association between student outcomes and being selected to partner with Solution Tree as a PLC at Work school.

Schools designated as PLC at Work partners were assigned cohorts based on their initial partnership year. This cohort structure addresses the potential influence of varying implementation timelines across selected schools. Table 1 presents information about cohorts, the year they were became a PLC at Work school, the number of schools selected, and the years when outcome data were available for analysis. Years after being selected as a PLC at Work school where data are available for analysis are signified by ‘Year 1’ through ‘Year 5’.

Table 1
PLC at Work Start Year and Outcome Year, by Cohort

<table>
<thead>
<tr>
<th>Cohort</th>
<th>N</th>
<th>PLC at Work Start</th>
<th>School Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>17-18  18-19  19-20  20-21  21-22  22-23</td>
</tr>
<tr>
<td>Cohort 1</td>
<td>11</td>
<td>2017-18</td>
<td>Year 1 Year 2 — Year 3 Year 4 Year 5</td>
</tr>
<tr>
<td>Cohort 2</td>
<td>13</td>
<td>2018-19</td>
<td>Year 1 — Year 2 Year 3 Year 4</td>
</tr>
<tr>
<td>Cohort 3</td>
<td>25</td>
<td>2019-20/2020-21</td>
<td>— Year 1 Year 2 Year 3</td>
</tr>
<tr>
<td>Cohort 4</td>
<td>18</td>
<td>2021-22</td>
<td>— Year 1 Year 2</td>
</tr>
<tr>
<td>Cohort 5</td>
<td>23</td>
<td>2022-23</td>
<td>— Year 1</td>
</tr>
</tbody>
</table>

Arkansas schools interested in becoming a PLC at Work school were required to apply and be selected to participate in the program, introducing the potential for selected schools to vary in meaningful ways from schools that did not apply or were not selected. We established a comparison group of schools for each cohort of PLC at Work schools through a matching process utilizing a variety of school characteristics. The comparison group of non-PLC at Work schools resembles the group of PLC at Work schools on characteristics that might influence student outcomes.

Methodology
To assess the relationship between the PLC at Work program and student academic achievement and growth, we utilized an approach that acknowledges the non-random assignment of schools to the program. First, a difference-in-differences (DiD) frame was utilized to estimate the program’s overall effect. Secondly, we employed an Event Study methodology to assess the impact of PLC at Work overtime. This approach allows us to compare the change in student outcomes in schools selected as PLC at Work with those in non-PLC at Work schools across the years following implementation.
Outcomes of Interest
Our analysis examines publicly available school-level measures of student achievement and academic growth used in Arkansas's state and federal school accountability systems to determine if the PLC at Work program enhances student learning. PLC at Work professional development begins in the fall of the school year, and Arkansas's required assessments for students in grades 3-10 occur in spring. Selected schools received PLC at Work professional development for at least seven months prior to students completing the annual assessments in the first year of PLC at Work participation. Scores for PLC at Work schools, therefore, reflect the impact of PLC at Work on students' achievement and growth.

Weighted Achievement: Weighted Achievement reflects how students in a school performed on annual state-required assessments in math and English Language Arts (ELA). In the 2022-23 school year, weighted achievement scores for all Arkansas schools ranged from 0 to 113, with a mean of 51.8 and a standard deviation of 16.7.

Value-Added Growth: Value-Added Growth reflects a student's progress over time on annual state-required math and English Language Arts (ELA) assessments in grades 3-10. In the 2022-23 school year, school value-added scores for all Arkansas schools ranged from 63 to 92, with a mean of 80.1 and a standard deviation of 2.8.

Results
Weighted Achievement
Figure 1 presents these findings for average weighted achievement over time before and after participating in the PLC at Work program for all students, while Figure 2 presents these findings for economically disadvantaged students. A value of zero on the y-axis indicates that students in PLC at Work schools performed similarly to comparison schools relative to their baseline achievement. Positive values suggest that PLC at Work schools outperformed comparison schools regarding achievement gains, while negative values indicate that PLC at Work schools experienced smaller achievement gains than non-PLC at Work schools. Results are statistically significant only if the shaded area does not include zero.

Figure 1
Combined Effects of PLC at Work on School-Level Average Weighted Achievement by Year, All Students

![Graph showing combined effects of PLC at Work on school-level average weighted achievement by year, all students.](image-url)
Overall estimates indicate that students in PLC at Work schools demonstrated similar weighted achievement scores compared to students in similar schools that were not selected to participate in the PLC at Work program. Economically disadvantaged students in PLC at Work schools demonstrated decreases in weighted achievement scores compared to similar students in schools that were not selected to participate in the PLC at Work program. Differences between student achievement in PLC at Work schools after participating in the program were not statistically significantly different than student achievement in non-PLC at Work schools.

The lack of consistent, statistically significant positive estimates indicates that student achievement in PLC at Work schools is not increasing more than student achievement in non-PLC at Work schools.

**Value Added Growth**

Figure 3 presents the findings for value-added growth across all cohorts for all students, while Figure 4 presents the findings for value-added growth for students facing economic disadvantages. Positive values suggest that PLC at Work schools outperformed comparison schools regarding student learning growth, while negative values indicate that PLC at Work schools experienced smaller learning gains than comparison schools. Results are statistically significant only if the shaded area does not include zero.

Our analysis of student value-added growth revealed the academic growth of students in PLC at Work schools was like that of students in non-PLC at Work schools. Overall estimates for all students and for economically disadvantaged students indicate that differences between student growth in PLC at Work schools were not statistically significantly different than student growth in non-PLC at Work schools.

The lack of consistent, statistically significant positive estimates highlights the lack of effectiveness of the PLC at Work model in increasing student value-added growth.
**Figure 3**
Combined Effects of PLC at Work on School-Level Value Added Growth by Year, All Students

**Figure 4**
Combined Effects of PLC at Work on School-Level Value Added Growth by Year, Economically Disadvantaged Students
Summary
This study investigated the effect of participating in the Solution Tree PLC at Work program and student achievement and growth in Arkansas schools. We employed a comprehensive dataset and robust analytical methods to examine the program's effectiveness in enhancing student academic outcomes across multiple cohorts.

Our findings revealed no statistically significant effect of PLC at Work participation on weighted student achievement or student value-added growth.

Policy Recommendations
We propose the following policy recommendations regarding the PLC at Work program:

1. **Enhanced Data Transparency from Solution Tree:**
   We recommend increased data collection and transparency from the PLC at Work program provider, Solution Tree, to strengthen program evaluation and accountability. We recommend a standardized data collection system across all participating schools with data available for the public and relevant stakeholders.

2. **Strengthened Oversight and Accountability:**
   Regular, independent evaluations, conducted by unbiased outside researchers, to assess program effectiveness and its impact on diverse student groups. Evaluations should consider implementation fidelity, cost-effectiveness, and student academic outcomes.

3. **Audit of PLC at Work Program Effectiveness:**
   A comprehensive, independent audit is recommended to optimize the PLC at Work program in Arkansas. This audit should focus on Solution Tree's on-site support, examining schedules and activity logs to assess time utilization and conducting stakeholder interviews to identify potential gaps between planned activities and school needs. The audit should incorporate surveys or focus groups to evaluate teachers’ perspectives on the provided resources' helpfulness and alignment with PLC needs and teacher access to alternative professional development opportunities.

In summary, the findings from our study indicate that its current implementation in Arkansas has not resulted in significant improvements in student academic outcomes. Addressing the identified areas for enhancement—such as improving data transparency, strengthening oversight, and conducting thorough program audits—can help policymakers and educators better understand if the PLC at Work model is improving academic outcomes for Arkansas students.

Sources: