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LITERACY DESIGN COLLABORATIVE 2018–2019 EVALUATION REPORT

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Executive Summary

The Literacy Design Collaborative (LDC) was created in 2009 to support teachers in implementing Common Core State Standards (CCSS) and embedding literacy skill development throughout content area curriculum. Engaged in the evaluation of LDC tools since June 2011, UCLA's National Center for Research on Evaluation, Standards, and Student Testing (CRESST) is the independent evaluator for LDC's current federally funded i3 validation grant. CRESST's evaluation study is using multiple data sources and a quasi-experimental design (QED) to examine LDC implementation and impact in two cohorts of schools in two large, urban school districts.

This report presents the results on implementation of LDC in the large urban school district on the West Coast during the third year of the intervention, and the impact of the program across multiple years. The study schools serve largely Hispanic populations, with a high proportion of students qualifying for free or reduced-price lunch, and many English language learners. As of 2018–2019, participating schools included 11 from Cohort 1, which began implementation during 2016−2017, and 23 from Cohort 2, which commenced at the beginning of the 2017−2018 school year. Our primary impact analyses, presented in this report for the first time, pool teachers from both cohorts to measure their impact after participating in LDC for 2 consecutive years (2017–2018 for Cohort 1 and 2018–2019 for Cohort 2).

The CRESST evaluation addresses research questions in three major areas:

- Program Characteristics and Implementation
- Contextual Factors and Implementation
- Program Impacts

The findings draw on multiple data sources and methods across the 5 years of the study. These include surveys of teachers, teacher leaders, and administrators; analysis of the quality of performance tasks called LDC modules[1], which are a central manifestation of LDC practice;

[1] An LDC module is a standards-embedded performance task assignment that explicitly guides students to write in response to reading complex and discipline-specific texts. The LDC module includes an assignment prompt and accompanying backwards-design instructional plan for teachers to implement in the classroom.

participant interactions with LDC CoreTools, the electronic platform through which teachers access LDC professional development resources (online courses, existing LDC modules, module templates, and support for module development); data on teacher attendance, meeting lengths, and coach/teacher leader calls captured in professional learning communities (PLC) reflection forms; LDC administrative records capturing attendance at PLC sessions and professional development offerings for teacher leaders and administrators; and administrative data on students and teachers including class rosters, student demographics, and student performance on state standards-based assessments. We begin with the overall findings and then summarize participants' perspectives on key LDC components, intermediate effects on teachers' instructional strategies and practice, and effects on student outcomes. Detailed evidence with regard to key LDC activities, supports, and pedagogical impacts help to explain the mostly positive findings and offer implications for further strengthening LDC.

Overall Findings

Findings from both participant surveys and analyses of student outcomes reveal positive results for the LDC intervention:

- Analysis of student outcomes provided evidence of the program's effectiveness and confirmation for participants' positive views. Quasi-experimental analyses demonstrated a statistically significant positive impact of LDC as practiced by middle school teachers with 2 years of program experience. For middle school students exposed to LDC instruction in English language arts (ELA), social studies/history, and science, effect sizes translated to a striking 9.4 months of additional learning compared to similar peers. The effect size for the average observed student (who received a smaller dose of LDC instruction) translated to a still very impressive 4.1 months of additional learning compared to similar peers. A statistically significant positive impact was also found for Cohort 2 middle schools after just one year of implementation. Although in the positive direction, the effect estimate at the elementary school level after 2 years of implementation was considerably smaller than the middle school effect and not statistically significant. The study, therefore, does not provide evidence for an impact at the elementary school level. It is important to recognize some limitations of the elementary school analysis, including the inability to include lower grade teachers and their students due to the lack of state assessment data at those grade levels. The results are therefore not generalizable to the full population of elementary school implementers and their students.
- Participants across all groups perceived a positive impact on student outcomes. A large majority of both teachers and administrators agreed that LDC helped improve student learning across multiple areas, including college and career readiness, literacy performance, writing, and content knowledge. The two most highly rated areas of impact, according to all three groups, were students' ability to complete writing assignments and quality of students' writing.

- Across all 3 years of the study, teacher, teacher leader, and administrator participants reported very positive attitudes toward LDC. Teachers appreciated the opportunity to collaborate and share practice, generally reported that the range of in-person and digital supports was helpful, and agreed that participating in LDC positively impacted their practice, in areas such as engaging students in complex text, locating evidence of standards in final student work, and engaging students in understanding the performance task assignment and standards/rubric. Administrators generally saw LDC as a productive tool for meeting school instructional goals, but had some concerns with the intensive weekly time commitment needed to implement the program, with some administrators choosing to discontinue participation or dedicate less time to the program in favor of other priorities.

Professional Learning Community and Teacher Collaboration

- Nearly all LDC teachers participated in LDC-oriented PLCs. The frequency with which PLCs met in 2018–2019, however, varied greatly across schools, with the number of recorded PLC meetings ranging between four and 20 times in the year, and averaging 12.6 times. The average teacher's individual attendance rate was 78%, but again there was great variation. About two thirds of teachers met the teacher-level fidelity threshold of 80% attendance. About half of schools met the program goal of three quarters of PLC participants attending 80% of sessions, with some schools experiencing challenges related to protecting planning time and ensuring that teacher participants attended PLC meetings. Both teacher surveys and PLC reflection forms indicated that PLC meetings typically lasted 45 to 59 minutes or an hour or more, and therefore met the LDC expectation.
- Teachers valued the collaborative nature of LDC and its PLCs. A large majority of teachers credited LDC with making them more likely to collaborate with other teachers, not only within their grade levels and content areas but outside of them as well.

LDC Training and Support

- Teachers were nearly uniform in their positive attitudes about the value of their PLC participation. They found the PLCs a safe space for sharing instructional plans, problem solving, and learning to develop modules.
- Teacher leaders were almost universally reported to be highly approachable, supportive, knowledgeable, and helpful.
- Teacher leaders reported high satisfaction regarding the support they received from coaches, professional development offerings, and how the teacher leader role allowed them to be instructional leaders in their schools.
- Overall, LDC coaches received positive feedback on the survey, with 96% of teachers and 97% of teacher leaders reporting that their coaches gave them appropriate and timely feedback and support. Data suggest room for improvement when it comes to frequency and usefulness of coach feedback. While coaches were somewhat more

likely to meet fidelity thresholds on module comments in 2018−2019 than 2017−2018, peer review was used even less frequently in 2018−2019 than it was used in 2017−2018.

- Most teachers rated CoreTools positively, which demonstrated the success of changes LDC made prior to the 2017−2018 school year including refinement of the content, sequencing, delivery of CoreTools' instructional content, and streamlining of participants' learning process. Overall, teachers were enthusiastic about much of the online learning content, with more than four out of five teachers rating most aspects as good or excellent. Almost a third of teachers, however, were concerned with the ease of use of the online course materials. Despite teachers' positive attitudes, analysis of CoreTools data revealed that teachers were being exposed to a less online course content than program goals intended. There was some improvement in this area from 2017−2018 to 2018−2019, with a small number of schools meeting fidelity of implementation on exposure to the instructional content, but still exposure rates were considerably lower than fidelity thresholds. It is possible that there wasn't sufficient PLC time to cover the content with which LDC intended participants to engage.

LDC Implementation

- Teachers typically reported adapting/creating and implementing two LDC modules across the school year, which meets LDC program expectations.
- Analysis of program data suggests that while nearly all participants were engaging with the module-building platform to some extent, the level of engagement varied greatly across individuals and across subgroups (role, cohort, school level, content area) as evidenced by the wide range in the number of views, edits, and comments across teachers. More in-depth analysis of the portions of the modules that teachers edited indicated that engagement varied greatly across teachers' user accounts, with about half of user accounts associated with engagement at a basic level (editing the teaching task), and other accounts associated with deeper engagement (editing multiple portions of modules). It is important to note that in response to teachers collaborating on and implementing common modules in schools, LDC refined its data collection in the summer of 2018 to include tracking engagement data on modules that teachers collaborated on. The fidelity matrix, and CRESST's analyses of editing data, were not designed to capture this shift toward a collaborative model of instructional design in CoreTools, and therefore may not fully capture engagement in the design process.
- The majority of teachers (79% to 93%) reported success in nine key areas of LDC module development. Teachers were most confident in selecting focus standards, creating the writing assignment, identifying skills needed in the module, and making writing assignments relevant and engaging. The module analysis, however, suggests that the materials adapted and created by PLC members varied in levels of completion and quality.

- With regard to their classroom implementation of LDC modules, the majority of teachers reported success with all six key areas queried (86% to 92%). Teachers were most confident with engaging students in complex text, locating evidence of standards in final student work, and engaging students in understanding the assignment and rubric.

Leadership Support

- Almost all teachers and teacher leaders reported that their administrators encouraged LDC participation at the school. The majority of teachers and teacher leaders agreed with administrators that they allocated resources to ensure that LDC teachers could participate in meetings. Administrators generally voiced strong support for LDC, but varied in their level of direct engagement with the work, with some taking a hands-on approach by attending many PLC meetings, and some not.
- Overall, most administrators and teacher leaders took advantage of in-person meetings offered by LDC. There was less consistency in terms of the frequency of teacher leader/coach planning calls, with about 40% of schools meeting the fidelity goal, and teacher leaders and coaches meeting over the phone less frequently in the remainder of the schools.

Impact on Teacher Practice

- The majority of teachers reported improving their practice in seven LDC-related skills (79% to 88%). Teachers were a bit more likely to report impact on selecting focus standards for an assignment, creating standards-driven writing assignments, and identifying skills that students need in writing assignments (skills concentrated at the beginning of the LDC learning cycle).
- Over 80% of teachers agreed that participating in LDC raised their expectations for students' writing, helped them incorporate writing assignments into their existing curriculum, and made them more likely to collaborate with other teachers on designing instruction.
- Among teachers who completed the survey in both 2017−2018 and 2018−2019, attitudes around impact on teacher skills and practices were on average even more positive in 2018−2019 than 2017−2018.
- Overall, CRESST's ratings of module quality decreased from 2017−2018 to 2018−2019, when looking at all rated modules and those modules created by a subpopulation of teachers who were present in both years. This change contrasts with an increase in the quality of modules scored by CRESST from 2016−2017 to 2017−2018. Please note, however, that sample sizes are small and thus comparisons across years are exploratory in nature.

Sustainability

- Survey respondents generally reported confidence that the LDC program would be sustained in their schools. Analysis of attrition patterns, however, reveals concerns

about sustaining the LDC initiative in schools. Even with the substantial supports provided by LDC, a number of administrators decided over the course of the 3 years that they did not have the resources (particularly staff time) to remain in the program. Competition for time between different reform efforts and school priorities seemed to play a role in whether schools remained in the LDC program.

- Based on the exit interviews conducted by LDC staff, school leadership teams indicated that LDC practice was likely to continue at some level in the majority of schools. Some principals and assistant principals were committed to protecting common planning time and expanding the use of the LDC planning process to other grades and subjects. A handful of schools demonstrated strong commitment to LDC practice by purchasing LDC product licenses. In other cases, administrators were unlikely to provide support into the future, and therefore practice was less likely to be consistent and to spread across the school.

Impact on Student Learning

- Quasi-experimental analyses revealed a statistically significant positive impact of middle school teachers with 2 years of LDC experience on student ELA scores. The dosage-dependent version of our model also suggests that students who were exposed to LDC instruction in a greater number of core content classes benefited more from the program. Supplemental analysis also indicates that impact was greatest for students who were exposed to LDC in half or more of their class time in core subjects (ELA, social studies, and science).
- The study does not provide evidence of an impact of LDC on student ELA scores at the elementary school level after teachers participated for 2 consecutive years. It is important to note that it was only possible to test the impact of LDC in upper elementary grades, so the finding is not generalizable to the full population of elementary teachers implementing LDC and their students. Also, an analysis of Cohort 1 middle school teachers in their third year of LDC implementation did not detect an impact, with limited sample size due to attrition likely a factor.
- Survey respondents were nearly uniform in perceiving a range of positive impacts of LDC on student learning. Among teachers who completed the survey in both 2017−2018 and 2018−2019, attitudes about LDC impact on students were on average even higher in 2018−2019 than in 2017−2018.

Conclusions

UCLA CRESST's multiyear mixed methods evaluation of LDC as implemented in a large urban West Coast school district provides evidence that LDC is an effective tool for increasing student learning in English language arts. LDC's theory of action predicted that teachers would need to participate in the program for at least 2 years to effectively deliver LDC-infused instruction, and positively impact student learning, as measured by student assessment scores. Our quasi-experimental design analyses provide confirmation for that hypothesis, particularly at the middle school level, with students under teachers with 2 consecutive years of LDC

participation performing at significantly higher levels than the comparison group of matched students in matched schools in the same district. That effect translates to 9.4 months of additional learning for students exposed to LDC in all their core content area, and 4.1 months of additional learning for the average observed student in the study. Our dosage-dependent model also suggests that middle school students with higher levels of exposure to LDC (by being exposed to multiple teachers in different content areas implementing LDC) benefited more from the program. A positive statistically significant impact was also found for Cohort 2 middle school students after one year, which provides further evidence of the efficacy of LDC at the middle school level.

A similar effect was not found at the elementary school level with the present data, although attrition and the inability to include lower grade elementary teachers and students in the analyses may have played a role. As noted above, our study also suggests that more LDC is better; since most elementary students were exposed to only one teacher implementing LDC, the program expectation of each teacher implementing two modules per year may not have led to elementary students receiving a sufficient dosage of LDC to affect their learning. Further investigation of LDC's impact at the elementary level would be beneficial.

Implementation data demonstrated great appreciation for LDC among teachers, teacher leaders, and administrators. Educators found LDC to be a helpful tool for fostering collaboration, creating a safe space for sharing practice, and increasing teacher skills and knowledge around literacy instructional design and teaching. Despite broad support, however, many schools and teachers did not meet fidelity thresholds related to attendance, exposure to instructional content, and principal observation of LDC instruction. The findings demonstrate the importance of school leaders and teachers understanding and committing to the program in advance of implementation, and school leaders dedicating substantial resources to the program, particularly time for common planning. Under these ideal conditions, LDC may show even greater impacts on teacher practice and student learning.

In summary, our multiyear mixed methods evaluation of the LDC as implemented in a large urban West Coast school district provides evidence that students exposed to LDC instruction made significant gains in learning, particularly at the middle school level. Furthermore, teachers were nearly uniform in their positive attitudes about the value of their PLC participation. They valued the collaborative nature of LDC and its PLCs and reported improving their practice in LDC-related skills and improved student learning. Despite the challenges in implementing LDC as intended, the student outcome analyses found LDC is an effective tool for increasing student learning in English language arts at the middle school level.

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1.0 Introduction

The Literacy Design Collaborative (LDC) was created in 2009 to support teachers in implementing Common Core State Standards (CCSS) by integrating literacy skill development throughout the content areas. LDC is a national community of educators providing a teacher-designed and research-based framework, online tools, and resources for creating both literacy-rich assignments and courses across content areas. Used by individual teachers, schools, and districts in 40 states, LDC also is a statewide-adopted strategy for Common Core implementation in Kentucky, Colorado, Louisiana, and Georgia.

UCLA's National Center for Research on Evaluation, Standards, and Student Testing (CRESST), in collaboration with its partner Research for Action (RFA), engaged in the evaluation of LDC implementation and its impact on student learning and teacher effectiveness starting in June 2011, via two parallel research studies funded by the Bill and Melinda Gates Foundation. Those studies included an examination of LDC implementation in eighth grade social studies and science classrooms in Kentucky and Pennsylvania and a districtwide implementation in sixth grade advanced reading classes in a large district in Florida. Results for the studies are available in two CRESST reports (Herman et al., 2015a; Herman et al., 2015b), as well as a journal article published by AERA Open (Herman et al., 2016).

Because of its earlier success in helping students and teachers in middle schools, LDC received an Investing in Innovation (i3) validation grant to further develop the program. The current i3 project focuses on developing teacher competencies through job-embedded professional development and the use of professional learning communities (PLCs). Teachers work collaboratively with coaches to develop their expertise further and design standards-driven, literacy-rich writing assignments within their existing curriculum across all content areas. Currently, CRESST serves as the independent evaluator for LDC's federally funded i3 validation grant.

While the initial focus of the i3 grant was to serve teachers and students in middle schools, LDC responded to local conditions by expanding its implementation to also include elementary and high schools at both study districts: New York City Department of Education (NYCDOE) and a large urban school district on the West Coast (the latter of which this report is

focused on). The comprehensive mixed-methods evaluation includes quasi-experimental design (QED) analyses designed to estimate the impact of LDC on student learning, and documentation of LDC's impact on teacher skills and practices. Specifically, the evaluation study addresses a wide range of questions about program characteristics, conditions, and impacts in the context of the two school districts. The study measures teacher implementation and skill improvement with teacher surveys, analytic data from LDC's online CoreTools module building platform, PLC reflection forms, and artifact analysis. While we document the core strategies of the LDC model as implemented and provide support for LDC improvement, the central focus of our comprehensive mixed-methods evaluation is to examine the impact of LDC on student learning using a QED.

This report examines LDC implementation during the 2018−2019 school year in the large, West Coast school district, and the impact of LDC on student learning across 2017−2018 and 2018−2019. It draws on data from two cohorts of schools, with each school housing a PLC of teachers who engage in professional learning about LDC and implement LDC mini-tasks and modules in their classrooms. The first cohort of schools began implementing LDC during the 2016−2017 school year, and the second cohort began implementation during the 2017−2018 school year. A parallel report focusing on implementation in NYCDOE will be prepared during 2020 once the student outcome data become available and we finish conducting the analysis.

In this report, we present results from (a) surveys of classroom teachers, LDC teacher leaders, and school administrators; (b) analyses describing how LDC participants interacted with the CoreTools module building platform; (c) CRESST ratings of instructional modules created by LDC participants; (d) analysis of the fidelity of implementation across multiple key components, indicators, and data sources; and (e) confirmatory and exploratory student outcome analyses using QED techniques.

Survey results provide a window into how LDC was implemented in 2018−2019 (the final study year), the perceived utility and effectiveness of various program components, and the perceived impact of LDC on both teacher and student skills and knowledge. The analysis of CoreTools user data and modules created and adapted by teachers provides evidence on the level of engagement with the online platform and module design process, and the quality of the products created by the teachers and PLCs. Fidelity of implementation analysis, utilizing the fidelity matrix designed collaboratively by LDC and CRESST, provides a broad picture of how schools and the program as a whole performed on key fidelity indicators in 2018–2019.

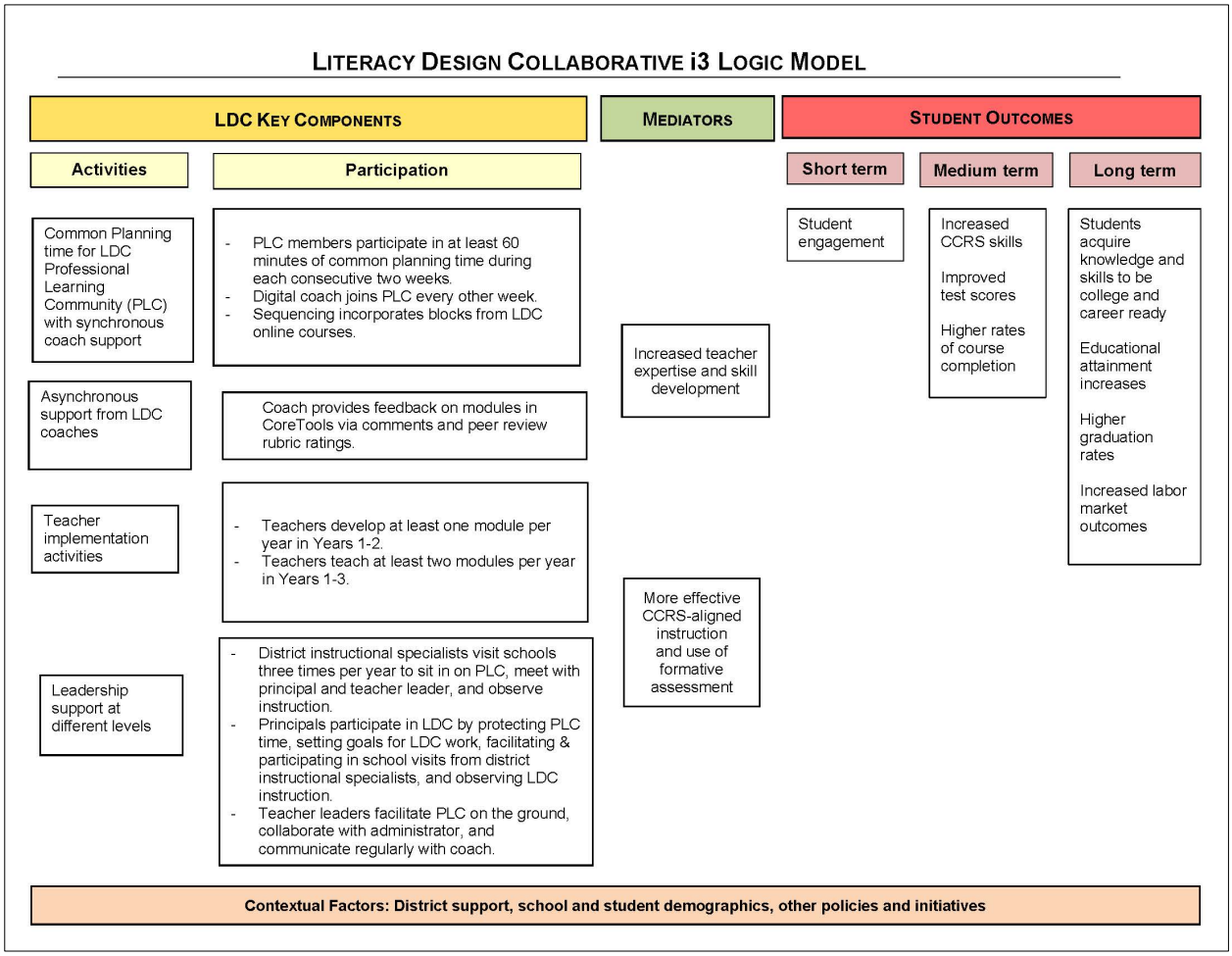
Our primary quasi-experimental analyses illuminate the impact of LDC on students, as practiced by teachers who amassed 2 or more years of experience with LDC. In addition, supplementary analyses examine the impact of Cohort 2 teachers alone and the impact on subgroups of students based on whether they were exposed to LDC in the prior year and how much exposure they had to LDC in the outcome year.

1.1 Logic Model

The logic model includes four key intervention components that are predicted to be the drivers of change in teacher practice and student learning (see Figure 1.1). These components include a coach-supported *professional learning community* formed to implement the LDC intervention at the school site and provide a space for teacher collaboration; *asynchronous support from coaches* primarily in the form of feedback in CoreTools through comments and peer review; *implementation activities* completed by participating teachers including module development and classroom implementation; and *leadership support* at different levels. Note that the model also indicates LDC's expectations for the level of implementation in each area.

Figure 1.1

LDC i3 Logic Model



The logic model predicts that the four key components will lead to increased teacher expertise and skill development and more effective Common Core aligned instruction that

incorporates ongoing formative assessment. In turn, increased teacher capacity and more effective instruction will lead to increased student engagement in the short term; increased student skill acquisition, higher test scores, and higher rates of course completion in the medium term; and improved college and career readiness, education attainment, graduation rates, and labor market outcomes in the long term.

Note that the logic model was revised based on refinements to the program in response to learning from both the pilot year (2015–2016) and Cohort 1's first year of implementation in 2016–2017.

1.2 Evaluation Questions

Our evaluation questions focus on addressing three main areas: program characteristics and implementation, contextual factors and implementation, and program impacts. This is the first report to provide results on our primary outcomes analyses, estimating the impact of LDC on student learning, as implemented by teachers participating in the program for 2 consecutive years.

1. Program Characteristics and Implementation
    a. Who are the participating teachers and schools? Are they representative of the teacher/school populations of the respective district on years of teaching, education level, prior student performance, etc.?
    b. How is the LDC program implemented in each district? What are the core components (e.g., training, tools, on-site or other direct support) and who are the key participants? In what ways did the LDC implementation align with the intended model?
    c. In what ways do teachers implement the LDC tools in their classrooms? To what extent do teacher practices align with intended LDC practices?
    d. How are teachers utilizing the online LDC system (including online tools, exemplars, collaborative workspaces, and technical assistance) in terms of frequency and use of key features? Does this vary by teacher characteristics? What are teachers' perceptions of the value and quality of the online LDC system?
    e. What types of LDC professional development opportunities are offered to and utilized by teachers at each school/district? Are teachers and schools satisfied with the LDC professional development opportunities they received?
2. Contextual Factors and Implementation
    a. What factors facilitate or hinder successful implementation of the LDC model at the teacher, school, and district levels?
    b. How can implementation of the model be improved at the teacher, school, and district levels?

c. What other educational reforms are being implemented in the participating schools and districts? What are their influences on LDC adoption in the schools and districts? Are schools able to align reform efforts?

d. What are the roles of school and district leadership in shaping the LDC implementation?

3. Program Impacts

a. What is the impact of LDC on the academic performance of participating students as measured by the state assessments?

b. Do the academic impacts vary by student subgroup including prior achievement, race, ethnicity, socioeconomic status, gender, language proficiency, and/or disability? Does LDC help close the achievement gap between student subgroups?

c. Do the academic impacts vary by student grade level or subject?

d. What is the impact of LDC on teacher skill improvement and learning as measured by CoreTools and by the quality of LDC modules they produce? What is the self-reported impact of LDC on teacher learning?

e. To what extent do teachers report changes in their practice (e.g., teaching strategy, collaboration with others) and changes in their comfort in implementing CCSS during and after the LDC intervention?

f. What is the relationship between the fidelity of implementation, fidelity of intervention, and student learning? What are the conditions and contexts under which LDC tool use is most effective?

g. To what extent do Cohort 1 participating schools and teachers continue their LDC-influenced practices in the 2019–2020 school year after LDC support ends? What contributed to their decision to continue or stop? What factors contributed to their levels of continued implementation? How do Cohort 1's actions align with their previously stated intentions for continuation of LDC-influenced practices as reported in spring 2017? To what extent do Cohort 2 participating schools and teachers plan to continue their LDC-influenced practices after LDC support ends?

2.0 Study Methodology

In this chapter, we provide an overview of the methodology behind this report on LDC implementation and effects. We begin by describing the various instruments and data sources for the analyses, including surveys of classroom teachers and teacher leaders participating in PLCs as well as administrators overseeing the implementation; analytic data from LDC's CoreTools platform; module artifacts including samples of student work; LDC administrative data; and district administrative data on students and teachers used for the outcomes analyses. We then describe the sample of educators and schools for each of these data sources. Finally, we discuss the methodological approaches for the various analyses we conducted.

2.1 Data and Instruments

We next describe each of the data instruments and the elements they contain. Most variables are measured at the teacher level, which is the unit at which the LDC intervention is being implemented. Administrative data for the analysis of the impact of LDC on student learning includes school-, teacher-, and student-level variables.

Surveys (Teachers, Teacher Leaders, and Administrators)

This report includes findings from the third and final year of survey collection in 2018−2019. In collaboration with LDC, CRESST previously made minor revisions to the 2016−2017 surveys for the 2017−2018 survey administration. These refinements involved streamlining the language of certain questions, in particular those capturing teacher pedagogical practice and the perceived impacts of LDC on teachers and students. In a few cases, questions and items were also added to collect systematic information on program conditions and impacts that were observed by LDC and CRESST anecdotally. The 2018−2019 surveys were substantively identical to the 2017−2018 surveys.

In 2018−2019, four different surveys were administered to LDC participants playing three different roles: teacher, teacher leader, and administrator. Some teacher leaders were classroom teachers who implemented LDC with their students, while other teacher leaders were out-of-classroom faculty (coaches or coordinators); these two groups received different versions of the survey tailored to their roles. Thus, four versions of the surveys were administered in spring 2019: (a) teacher, (b) teacher leader (for coaches and coordinators), (c) teacher leader (for teachers), and (d) administrator.

The surveys were designed to capture multiple perspectives on key aspects of LDC's logic model (see Figure 1.1), and to provide data to answer the evaluation's research questions presented earlier. Survey questions targeted at the three roles fall under the domains and subdomains in Table 2.1. Domains were selected to align with the LDC i3 logic model and with the CRESST evaluation questions. Note that most domains cover multiple subdomains, constructs, and survey questions. *Professional Learning Community/Teacher Collaboration,* for example, captures the intensity, frequency, and collaborative environment of common planning

time; *LDC Training and Support* includes quality of online courses, utility and effectiveness of coach support, etc.; and *LDC Implementation* encompasses module creation, classroom implementation of modules, and module peer review.

Table 2.1
Survey Domains for Three Respondent Groups

Domain	Teacher	Teacher leader	Administrator
LDC participation	X	X	X
Professional learning community/teacher collaboration	X	X	X
LDC training and support	X	X	X
LDC implementation			
• Module creation	X	X	
• Classroom implementation	X		
• Module peer review	X		
Alignment		X	X
Leadership support			
• Teacher leader support	X		
• School administrator support/classroom observation	X	X	X
• Teacher leader leadership role	X	X	X
• District support		X	X
Impact			
• Impact on teacher practice and learning	X		X
• Impact on student learning	X		X
Scale-up and sustainability		X	X
Facilitators and barriers	X		
Areas of improvement	X	X	X

Teachers and administrators were asked to reflect on both LDC's *Impact on Teacher Practice and Learning* and *Impact on Student Learning.* Questions within a number of domains further asked respondents to reflect on conditions and supports that may potentially impact LDC's implementation. These domains included teachers' perceptions of *Facilitators and Barriers* to implementation and perceptions regarding leadership roles and support for LDC at different levels. Teacher leaders and administrators were also asked for their perceptions

regarding if and how LDC would be sustained and expanded within the school. Finally, all respondents were asked open-ended questions regarding *Areas of Improvement* for LDC implementation. Teacher, teacher leader, and administrator survey results can be found in Chapter 3, and the survey instruments can be found in Appendices A, B, and C.

LDC CoreTools

The CRESST team received the LDC program data on i3 participants' interactions with the CoreTools module-building platform. The data files captured a number of behaviors including document page viewing, document editing, document commenting, coach use of peer review, exposure to LEARN instructional cycle content, and uploading of student work. The data contained date- and time-stamped records of participants' activities in all of these areas.

Using these data files, we were able to analyze variation in the number of times the participants viewed, edited, and commented on documents across the school year. We generated descriptive statistics (minimum, maximum, mean, and standard deviation) for the number of times participants viewed a document page, edited a module document, and commented on a module document. We then produced descriptive statistics on these behaviors for each role group (teacher, teacher leader, and administrator), school level (elementary, K–8, middle, 6–12, and high), cohort, and content area subgroup. We also compared the average engagement in these key activities across two groups: teachers who implemented modules as measured by the presence of uploaded student work and those teachers for whom we do not have evidence of module implementation. The results on these overall metrics of engagement are reported in Chapter 4.

CoreTools data were also used to analyze to what extent (a) teachers were exposed to instructional cycles of LEARN content; (b) coaches provided feedback via commenting and peer review functions; (c) teachers edited key portions of modules; and (d) teachers uploaded student work (a proxy for classroom implementation). Results for these indicators are reported in Chapter 6.

Modules

During the first year of the evaluation we adapted the existing module rating rubrics (Reisman et al., 2013) that were developed for earlier studies of LDC. The rubrics, presented in Appendix D, were designed to examine the instructional quality and coherence of the LDC modules, and to address the rigor in both content and literacy development materials (i.e., template task, student work samples, and descriptions of the pacing and goals of the modules). The first two dimensions examined the quality of the teaching task, while the remaining four dimensions focused more holistically on module quality: (a) effective writing task; (b) alignment to the CCSS and local and state literacy and content standards; (c) fidelity to LDC module instruction; (d) quality instructional strategies; (e) coherence and clarity of module; and (f) overall impression.

Each of the dimensions was rated using a 5-point scale with anchor points on the first five dimensions ranging from *not present or realized* to *fully present or realized* and the final dimension ranging from *inadequate* to *advanced* LDC module implementation. This scale mimics the structure of the three-level LDC jurying system scale that uses the ordered anchors of *work in progress*, *good to go*, and *exemplary quality*. For each dimension, a 1 represented the lowest possible level of quality, while a 5 represented the highest level of quality (see Appendix D).

LDC Administrative Records

The fidelity matrix analyses in Chapter 6 utilize administrative records collected by LDC as part of their ongoing program management. These records include (a) PLC reflection forms, and (b) attendance records for in-person meetings organized for the benefit of school administrators and teacher leaders. The PLC reflection form captures attendance at regular PLC meetings, the amount of time spent on LDC during these meetings, whether teacher leaders had a separate planning call with coaches, and the subjects that PLCs were working on during sessions.

Administrative Data Used in Student Outcomes Analysis

Student-level variables utilized in the outcome analysis included race/ethnicity, gender, free or reduced-price lunch eligibility, special education status, English language proficiency, gifted status, grade, and baseline achievement in mathematics and English language arts (ELA), as well as outcome year achievement in ELA on state assessments. Teacher-level indicators obtained and utilized included years of teaching experience and teacher attendance. We also requested and received roster files that establish a link between teachers and students via specific courses.

2.2 Study Population and Generalizability

Here we describe the population of schools and teachers who participated in LDC, how that population changed over time, and how that population compared to all schools and teachers in the district. Over the course of the project, two cohorts of schools were recruited to participate in LDC, with one cohort beginning implementation in 2016−2017 and a second cohort beginning in 2017−2018. The initial 20 Cohort 1 schools included 11 elementary schools, four middle schools, one high school, two K−8 schools, one 6−12 school, and one K−12 school. Cohort 2 included 20 elementary schools, eight middle schools, two K−8 schools, and one 6−12 school. As displayed in Table 2.2, there was substantial attrition at both the school and student levels for each cohort. Nearly one third of Cohort 1 schools dropped out of the program after 2016−2017, and within the remaining Cohort 1 schools, nearly half of teachers did not continue with LDC in 2017−2018. Attrition in Cohort 2 was somewhat less pronounced but still very substantial. About one quarter of schools did not continue with LDC in 2018−2019, and almost 40% of the original Cohort 2 teachers left the program.

Table 2.2

Attrition of Cohort 1 and Cohort 2 Teachers, Administrators, and Schools

Sample	Teachers	Administrators	Schools
Cohort 1 (beginning 2016–2017)			
Participated in LDC in 2016–2017	154	34	20
Remained in LDC in 2017–2018	56	20	14
Attrition rate as of 2017–2018	64%	41%	30%
Remained in LDC in 2018–2019	29	14	11
Attrition rate as of 2018–2019	81%	59%	45%
Cohort 2 (beginning 2017–2018)			
Participated in LDC in 2017–2018	199	42	31
Remained in LDC in 2018–2019	122	27	23
Attrition rate as of 2018–2019	39%	36%	26%

To better understand teacher and school attrition, we conducted an interview study of school administrators in the 2017–2018 school year. Twenty principals and assistant principals from both the West Coast district and our parallel New York City Department of Education study volunteered to be interviewed. The principal interview responses revealed a diverse set of reasons. The main reason for teacher retention involved teacher and grade-level team decisions to leave or stay, followed by the principals' decision to switch participation of teachers between the 2 years. Buy-in also seemed to affect teachers' decisions on whether to continue. Although the sample was small, one of the reasons schools seemed to have dropped out was because they were overburdened by other priorities, including other reform efforts in the districts. Information submitted by school administrators to LDC confirmed that there were many other reform initiatives happening in schools during the study, including programs related to ELA, such as Early Language and Literacy Plans, Scholastic Leveled Bookrooms, and Achieve 3000. See Appendix E for a detailed description of the results as well as the methodology for the interview study.

In Table 2.3, we provide a snapshot of participation in 2018–2019, the final implementation year, by cohort, the year the teacher or administrator began participating in LDC, and school level. About two thirds of participants were from elementary schools, and about three quarters were from Cohort 2 schools. Both cohorts of schools also had teachers and administrators join LDC after the first year of implementation. Fifty-five teachers and administrators in Cohort 1 schools joined LDC in either 2017–2018 or 2018–2019 (18 of the participants who joined in 2017–2018 left after that year). Likewise, 83 teachers and administrators in Cohort 2 schools joined LDC in 2018–2019. These participants are not part of

our primary impact analyses. We planned to examine the impact of these late joining teachers in our supplementary impact analyses, but did not end up carrying them out because of insufficient teacher and/or student sample sizes.

Table 2.3

Number of Participants in 2018–2019 by Cohort/Start Year and School Level

Cohort/start year	Elementary	K–8	Middle	6–12	High	Total
Cohort 1 school/started 2016–2017	27	0	13	0	3	**43**
Cohort 1 school/started 2017–2018	9	0	5	0	2	**16**
Cohort 1 school/started 2018–2019	12	0	5	0	4	**21**
Cohort 2 school/started 2017–2018	92	16	26	15	0	**149**
Cohort 2 school/started 2018–2019	63	5	9	6	0	**83**
Total	203	21	58	21	9	312

Next we describe how the participating schools, teachers, and students in the LDC program compared to those in the school district as a whole. In Table 2.4, we provide a snapshot for each of the 3 study years. For each year, we present characteristics of schools and their Grades 3–8 student populations compared to all schools and all Grades 3–8 students in the district. These calculations omit high schools and K–2 schools, which are not the focus of the LDC program, and for which we did not receive data from the district.

Not surprisingly given LDC's focus on middle schools, the LDC treatment group had a greater proportion of middle schools and a smaller proportion of elementary schools than the district as a whole. In LDC schools, there were more students who were Black and Hispanic and fewer students who were White and Asian/Pacific Islander than the district's overall student population. Students in LDC schools were slightly more likely to be eligible for free or reduced-price lunch, and slightly less likely to be in gifted programs than students districtwide. Students were classified as limited English proficient and eligible for special education services in similar proportions in the two groups. LDC schools were slightly lower performing in both ELA and math than all schools in the district serving students in Grades 3–8.

Table 2.4

Characteristics of LDC Schools and Grades 3–8 Student Population at LDC Schools Compared to the District as a Whole

	2016–2017		2017–2018		2018–2019	
Variable	LDC	Whole district	LDC	Whole district	LDC	Whole district
School level						
Elementary schools (%)	55	79	65	78	68	78
Elementary/middle schools: K–8 (%)	10	2	5	3	6	3
Middle schools (%)	25	14	28	14	24	14
Middle/high schools: 6–12 (%)	5	3	2	4	3	4
K–12 schools (%)	5	1	0	2	0	2
Student-level characteristics						
Hispanic (%)	82	73	80	73	77	72
Black (%)	12	8	9	8	10	8
Asian/Pacific Islander (%)	2	7	4	6	4	6
White (%)	4	11	6	11	7	11
Female (%)	50	49	49	49	49	49
Limited English proficient (%)	20	19	16	16	17	18
Special education (%)	12	13	12	14	11	12
Gifted (%)	13	15	13	15	14	15
Free or reduced-price lunch (%)	64	62	89	82	87	84
Student achievement						
Mean standardized ELA achievement	-0.12	0.00	-0.09	0.00	-0.08	0.00
Mean standardized math achievement	-0.14	0.00	-0.09	0.00	-0.06	0.00

Next we explore how the main LDC teacher groups of interest compared to teachers districtwide (see Table 2.5). These groups are Cohort 1 teachers with 2 years of LDC participation as of 2017–2018 and Cohort 2 teachers with 2 years of LDC participation as of 2018–2019. We report on a number of teacher characteristics, as well as the mean achievement of these teachers' students in the baseline year. Not all variables were available for each of the two cohorts/years. For example, demographic characteristics were not available for 2017–2018. The analysis suggests that Cohort 1 teachers were a little less likely than teachers in the district as a whole to have 3 or fewer years of experience. Cohort 1 teachers

also taught students that were lower performing on average at baseline than Grades 3–8 students in the district as a whole. On average there were more Cohort 2 teachers who were Hispanic or Black and fewer Cohort 2 teachers who were White than in the district as a whole. Cohort 2 teachers taught students that were somewhat higher performing on average at baseline than students in the district as a whole.

Table 2.5

Characteristics of LDC Core Content Area Teachers With 2 Consecutive Years of LDC Participation and Districtwide Teachers, by Cohort/Year

	Cohort 1 in 2017–2018		Cohort 2 in 2018–2019	
Variable	LDC	Whole district	LDC	Whole district
Hispanic teachers (%)	N/A	N/A	48	41
Black (not Hispanic) teachers (%)	N/A	N/A	17	12
Asian (not Hispanic) teachers (%)	N/A	N/A	10	12
White (not Hispanic) teachers (%)	N/A	N/A	20	35
Female teachers (%)	N/A	N/A	67	68
Teachers with 3 years of experience or less (%)	8	12	16	15
Teachers with regular/permanent assignment (%)	N/A	N/A	86	82
Teacher attendance rate	97	96	93	94
Mean standardized ELA achievement at baseline of students taught by teachers	-0.40	-0.18	-0.02	-0.18
Mean standardized math achievement at baseline of students taught by teachers	-0.40	-0.18	0.03	-0.18

2.3 Sample for Implementation and Outcomes Analyses

Here we explore the teacher and administrator samples for the various implementation analyses in the final study year (2018–2019), as well as for outcomes analyses across the multiyear study. Table 2.6 displays the overall population and sample sizes for the different study measures and analyses included in this report. This includes all participants in 2018–2019. As can be seen, data were available for a large majority of the participants. Ninety-three percent of teachers consented to participate in the study, with 88% of all teachers completing the survey in spring 2019. All administrators consented to participate in the study, and 85% completed the survey. All teachers (100%) and nearly all administrators (96%) were present in the CoreTools dataset, which was provided directly to CRESST by LDC, and did not depend on

teachers' individual study consents. Nearly all teachers (94%) were present in the PLC reflection attendance data as well (three schools did not properly record the data and therefore there are no attendance data on teachers at these schools).

Table 2.6

Number of Participating Schools and Teachers in the District and Sample Size for Different Instruments, 2018–2019

Instruments	Classroom teachers	Administrators	Schools
Participated in LDC	264	48	34
Consented to CRESST study	246	48	34
Completed survey	231	41	33
Present in CoreTools dataset	264	46	34
Authored/coauthored a module with student work uploaded	194	N/A	33
Present in PLC reflection form attendance records	247	35	31
Leader in-person meeting attendance	N/A	N/A	34
Included in outcomes analysis for 2018–2019	104	N/A	25

The school district required individually signed consent forms before releasing teacher data and teacher/student rosters, so for the outcome analysis, we only received data on teachers who consented to participate in the study. Samples were further restricted by the need for student achievement data for both the outcome year (2017–2018 or 2018–2019 for Cohorts 1 and 2 respectively) and the baseline year (2015–2016 or 2016–2017 for Cohorts 1 and 2 respectively). As a result, participants teaching either in high school or the primary elementary grades (K–3) were not included in any of the student outcome analyses. Middle school teachers who did not teach a core ELA, science, or social studies/history class were also excluded from the analyses. Of the 264 teachers from 34 schools who participated in LDC in 2018–2019, 104 teachers from 25 schools were represented in at least one of the quasi-experimental analyses reported on in Chapter 7.

In Tables 2.7 and 2.8, we list all the potential teacher samples by cohort, school level, start year, and outcome year. Our previous reports examined the impact of LDC after 1 year for Cohort 1 and Cohort 2 elementary and middle school teachers. We also previously estimated the impact of Cohort 1 middle school teachers after 2 years of implementation. This final annual report includes models pooling across cohorts for each school level separately, and for the elementary and middle schools combined. We also examine the impact of LDC as

implemented in Cohort 1 schools by teachers with 3 years of LDC participation. We had also intended to conduct supplementary analyses examining the impact of teachers joining existing LDC PLCs in later years, but we did not have a sufficient number of teachers and students to conduct those analyses.

Table 2.7

Number of Cohort 1 Classroom Teachers, Implementation Years, School Level, and QED Eligible Students

School level/ start year	Outcome year	Years in LDC	Teachers	Consented teachers	Consented teachers with eligible students	Summary of reporting
Elementary school						
2016–2017	2016–2017	1	87	80	32	2017 Report
2016–2017	2017–2018	2	26	26	3	2019 Report[a]
2016–2017	2018–2019	3	17	17	0	Not conducted
2017–2018	2017–2018	1	22	21	1	Not conducted
2017–2018	2018–2019	2	10	10	0	Not conducted
2018–2019	2018–2019	1	11	10	0	Not conducted
Middle school						
2016–2017	2016–2017	1	41	40	35	2017 Report
2016–2017	2017–2018	2	23	23	22	2018 and 2019 Reports[b]
2016–2017	2018–2019	3	9	9	8	2019 Report
2017–2018	2017–2018	1	6	6	4	Not conducted
2017–2018	2018–2019	2	5	5	5	Not conducted
2018–2019	2018–2019	1	5	4	4	Not conducted
High school						
2016–2017	2016–2017	1	26	25	0	Not applicable
2016–2017	2017–2018	2	4	4	0	Not applicable
2016–2017	2018–2019	3	3	3	0	Not applicable
2017–2018	2017–2018	1	7	6	0	Not applicable
2017–2018	2018–2019	2	1	1	0	Not applicable
2018–2019	2018–2019	1	3	2	0	Not applicable

[a]There was insufficient sample size to test the impact of Cohort 1 elementary teachers in their second year of implementation independently, but these teachers were included in pooled analyses examining the impact of Cohort 1 and 2 elementary teachers after 2 years of implementation.

[b]This sample was reported on independently in the 2018 report, and also as a part of the pooled analyses in this report.

Table 2.8

Number of Cohort 2 Classroom Teachers, Implementation Years, School Level, and QED Eligible Students

School level/ start year	Outcome year	Years in LDC	Teachers	Consented teachers	Consented teachers with eligible students	Summary of reporting
Elementary school						
2017–2018	2017–2018	1	137	129	85	2018 Report
2017–2018	2018–2019	2	78	77	31	2019 Report
2018–2019	2018–2019	1	63	57	16	Not conducted
Middle school						
2017–2018	2017–2018	1	56	53	43	2018 Report
2017–2018	2018–2019	2	38	36	32	2019 Report
2018–2019	2018–2019	1	12	9	8	Not conducted
High school						
2017–2018	2017–2018	1	6	5	0	Not applicable
2017–2018	2018–2019	2	6	5	0	Not applicable
2018–2019	2018–2019	1	3	3	0	Not applicable

In addition to the CoreTools analytic files, we also received module artifacts from LDC teachers. We restricted our analysis to modules that were created during the 2018–2019 school year and included original uploaded student work examples, because these student examples were considered a proxy for implementation in the classroom and were required for module scoring. That restriction yielded a pool of 209 modules that were authored or coauthored by 194 teachers (nearly three quarters of all participating teachers) across 33 schools. To align with our research questions and to have analyzed modules be representative of the teacher sample, we sampled the last module created by each teacher wherein they served as the sole or lead author. Our intent was to represent teachers' best LDC work, and presumably, modules created later in the school year would be more skilled than those created earlier. The total sample was 155 modules. Table 2.9 provides further detail about the distribution of modules. We also conducted an exploratory analysis of the 40 elementary teachers and 27 secondary teachers who created a complete module both in 2018–2019 and in 2017–2018.

Table 2.9

Background Variables for the Primary Module Analysis

Variables	Elementary		Secondary		Total	
	#	%	#	%	#	%
Cohort/start year						
Cohort 1 (2016–2017)	16	15.4	4	7.8	20	12.9
Cohort 1 (2017–2018)	3	2.9	6	11.8	9	5.8
Cohort 1 (2018–2019)	4	3.8	2	3.9	6	3.9
Cohort 2 (2017–2018)	51	49.0	26	51.0	77	49.7
Cohort 2 (2018–2019)	30	28.8	13	25.5	43	27.7
Subject						
ELA	38	36.5	32	62.7	70	45.2
Science	43	41.3	3	5.9	46	29.7
Social studies	23	22.1	16	31.4	39	25.2
Total	104	67.1	51	32.9	155	100.0

2.4 Survey Recruitment and Administration

As in previous years, CRESST and LDC worked together to conduct the consent process for teachers and administrators who newly joined LDC in 2018–2019, and were successful in consenting 88% of these new participants. As required by the UCLA Office of the Human Research Protection Program, all consent forms included language stating that the study was voluntary, that data would be protected, and that by signing the form, participants consented to be emailed an electronic survey in spring 2019 and to have CRESST request district data linking them and their students. All participating teachers, teacher leaders, and administrators were also compensated with a $50 gift card after completing the survey.

Surveys were administered in spring 2019. CRESST coordinated with LDC staff and coaches to administer the online surveys during common planning sessions. Multiple email reminders were sent to participants who were not present at these sessions or who otherwise did not complete the survey. The teacher survey administration was closed at the end of the school year in June 2019. The administrator survey window was left open until early August when they returned from their summer break.

2.5 Module Rating Process

LDC requirements specified that all teachers implement a minimum of two modules over the course of the year, with the first spanning one week based on one text and the second

spanning across multiple weeks and incorporating multiple texts. Modules could be developed as original units of work or could be adapted from existing modules within the LDC CoreTools Library. Modules could also be either developed or adapted in solo or collaboratively with other teachers within the PLC. LDC modules were collected from elementary and secondary teachers who participated in LDC during the 2018–2019 school year. In total, 155 modules were rated with 50 or 32.3% being rated by two panelists. Further details about the modules can be found in Appendix F.

Eight expert raters with experience teaching in the targeted grade spans and content areas were recruited from Los Angeles County schools. Four panels were convened with two or three experts rating each of the following sets of modules: elementary ELA and social science, elementary and secondary science, secondary ELA, and secondary social science. It should be noted that one rater served on both the secondary ELA and the secondary social science panels. In addition, three of the teachers had 2 years of prior experience working as raters on the LDC module analyses and three had 1 year of prior experience.

Separate trainings lasting approximately 2 hours were conducted for each module scoring panel. All trainings were conducted by a member of the evaluation team who is an expert on the Common Core and the rating of student and teacher artifacts, and who had been conducting the training for the past three cycles of scoring. The training included an overview of the LDC goals, template task, the structure of the modules, and the CRESST rating dimensions. Once the training was complete, calibration was conducted by having teachers individually score and then discuss their ratings for one module in the content area on which they would be focusing. Scoring was then conducted on subsequent days with each module individually rated. Those modules rated by two expert teachers were then discussed with the goal, but not the requirement, to reach consensus (see Carlson & McCaslin, 2003). All discussions were facilitated by the same evaluation team who conducted the initial training.

2.6 Analytical Approaches

Both quantitative and qualitative analytic methodologies were applied to the data to answer the evaluation questions about how LDC was implemented, conditions affecting implementation, and program impacts. The following describes the approaches used to analyze each dataset.

Surveys

Survey responses were analyzed using descriptive statistics for multiple-choice items and qualitative coding for open-ended responses. As previously noted, surveys were administered to teachers, teacher leaders, and administrators. Some teacher leaders were classroom teachers while others were coaches or coordinators. Because of this, the samples were not mutually exclusive, with teacher leaders who taught in the classroom represented in both the teacher and teacher leader results. Generally, we report the number and percentage of respondents who selected different multiple-choice options. In a few cases, where responses

are numerical rather than categorical, we present means rather than proportions. Descriptive statistics for all multiple-choice items are presented in full in Appendix A for teachers, Appendix B for teacher leaders, and Appendix C for administrators.

LDC CoreTools

The first stage of our analysis examined the proportion of all participants who created CoreTools user accounts, and engaged in three key behaviors: viewing, editing, and commenting on modules. We then analyzed each of the three key measures of participants' interaction with the LDC online tools, and reported frequencies and/or descriptive statistics (e.g., minimum, maximum, mean, standard deviation) as measures of participants' engagement with the online LDC system. In addition to reporting the overall results, we provide results by cohort, the content areas taught (ELA, social studies/history, and science), by participant role (teacher, teacher leader, and administrator), and school level (elementary, K–8, middle, 6–12, and high) whenever feasible. Finally, we explored the difference in CoreTools engagement between two groups of teachers: those who completed and taught modules and those who did not appear to complete the design and implementation process.

Modules

We used descriptive statistics (means, standard deviations, and percentages) to analyze overall and subgroup performance for each content area, cohort, and school level on each of the six dimensions. This included analyses of the modules submitted during the 2018−2019 school year, as well as an exploratory analysis examining results across time for teachers who submitted modules during the last 2 school years. Additionally, generalizability theory (G theory) was used to examine potential sources of error during the rating process to help determine the validity of the scores as well as the construct validity of the rubrics (see Shavelson & Webb, 1991). Finally, teacher comments during the debriefings were examined to determine other potential issues with the rubrics and/or rating process.

Fidelity of Implementation Analysis

To examine fidelity of implementation we conducted descriptive analyses of a variety of data sources, including a teacher survey, CoreTools data, PLC reflection data, and attendance records for administrator and teacher leader in-person meetings. As outlined in the fidelity matrix (see Appendix G), fidelity levels were set at the teacher, module, school, and program levels. The process for most indicators involved several levels of aggregation, with, for example, module editing being measured at the teacher level, school level, and program level. School- and program-level scores were typically based on the proportion of teachers or modules that met the threshold for adequate implementation.

An analysis of the relationship between fidelity of implementation and residual outcomes was also conducted. This analysis utilized the analytic sample from our primary quasi-experimental investigation of the impact of LDC as practiced by teachers with 2 years of LDC

experience. Two models produced school and teacher residuals respectively. These residuals were then used to divide the sample into high-, medium-, and low-achieving schools and teachers. Descriptive analysis and one-way ANOVA were used to examine whether mean fidelity scores differed for the three different achievement groups. Additional information on methodology can be found in Chapter 6, Section 7.

Student Outcomes: Matching and Intervention Exposure

Here we describe (a) our approach to selecting matched schools and students for our quasi-experimental design analyses estimating the effect of LDC on student Smarter Balanced Assessment Consortium (Smarter Balanced) ELA assessment scores, and (b) our approach for modeling students' exposure to LDC and non-LDC instruction in core content classes.

For all our analyses, we used a two-step matching process to identify a reduced pool of comparison students and teachers at schools with similar characteristics to the schools in the intervention sample. To accomplish this, we first identified up to five of the most similar comparison schools for each intervention school based on a Euclidian distance measure, by using the nearest neighbor analysis option in SPSS 24.0 (see Fix & Hodges, 1951; Wang et al., 2007). The variables used in this process were the percentage of students eligible for free or reduced-price lunch, the percentage of Black students, mean baseline student achievement in ELA, mean baseline student achievement in mathematics, the average attendance rate of teachers, the percentage of teachers with 3 or fewer years of teaching experience, and the school grade span where feasible. We generally used all five identified comparison schools to establish the potential matching pool, but for selected LDC schools we only used four of the initial five matches. Once the pool of comparison schools was identified, their students and teachers were also identified, and student-level matching was conducted so that the resulting sample would resemble the type of sample one would expect to obtain through random assignment.

The student-level matching technique we employed was coarsened exact matching (CEM) (Iacus et al., 2011). CEM is a flexible matching approach with many favorable properties and allows the researcher to specify the precise conditions under which students are matched. For categorical variables, such as race/ethnicity or free or reduced-price lunch status, this can entail exact matching, while for continuous measures, such as baseline individual student achievement and aggregate class-level achievement, cut-points for matching can be specified. With this approach we were able to set precise cut-points on the most important baseline indicators, such as baseline academic achievement, to ensure that where possible every treatment student was matched with a suitable comparison. Student matching variables we used in CEM included Hispanic, Black, free or reduced-price lunch eligibility, female, English language proficiency (English language learner), special education status, gifted status, mean baseline achievement in mathematics and ELA, and grade level.

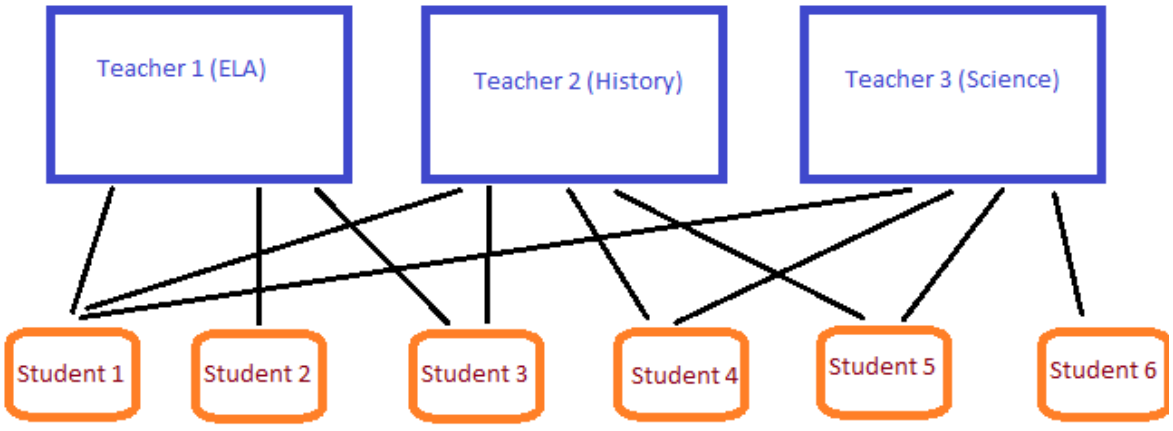
During matching we also included a few variables capturing information on the teachers and peers to whom students were exposed. These variables included mean baseline ELA achievement of the student's peers in his/her core content classes, and the percentage of core subject teachers with 3 years of teaching experience.

The typical structure of course taking at the middle school level involves students potentially being exposed to multiple teachers, with each responsible for a different core content class. Specifically, middle school students in the study had exposure opportunities across three content areas (ELA, social studies/history, and science) taught by intervention teachers. As a result, students were not necessarily nested under individual teachers, but instead were likely to have connections to multiple teachers in the available time period prior to each testing outcome (students at the elementary school level were also sometimes exposed to multiple teachers but to a lesser extent). Therefore, LDC effects were estimated using an extension of the standard multilevel modeling framework known as multiple membership multiple classification (MMMC) models (Browne et al., 2001).

These models can account for complex classification structures, such as the LDC context, in which students are nested within schools but are also members of multiple classes led by different teachers who may or may not be implementing LDC. MMMC has the flexibility to account for this type of complex nesting structure in which students are hierarchically nested under schools but may have one-to-many relationships with teachers. There are three classification levels in the models we employ: students, teachers, and schools. In the MMMC modeling approach, each observation at the lowest level represents one student. Figure 2.1 shows how students can be exposed to teachers in different content areas, who may or may not be participating in LDC. Our MMMC modeling approach can account for this complicated structure.

Figure 2.1

Variation in Student Exposure to Teachers



In the MMMC modeling approach, each observation at the lowest level represents one student. The weight each teacher receives with respect to each student is dependent on the student's exposure to his or her teachers in each of the three core content areas. The total student exposure adds to a unity (i.e., a possible total exposure of 1) across their courses in the three content areas in a given school year. While this general weighting approach applies to both elementary and middle schools, the course structure of the datasets required us to use different weighting procedures for elementary and middle schools.

In both the elementary and middle school datasets, students were linked to teachers through statewide course identifiers and accompanying terms in which each student was enrolled in a given course under a specified teacher. For elementary students, the terms consisted of three marking periods. For middle school students, the terms consisted of two semesters. Elementary students were required to have received marks in each of the three marking periods, and middle school students were required to have received grades in ELA courses in both semesters. Students could potentially have data records connected to multiple teachers covering varying time periods in the same course. For each of the three core content courses we then collapsed the links into a single measure of number of terms of potential content exposure.

In elementary school, in the event that a student was exposed to more than one teacher, each marking period was given equal weight in distributing teacher/student exposure. For example, if a student was enrolled in two marking periods under one teacher, then that teacher was coded as .67 for having contributed to two thirds of the students' core curriculum exposure. If the same student enrolled in the third marking period with a different teacher, then that third marking period teacher would have been coded as .33 and all other teachers in the sample would have been coded as zero. This would then result in the student's exposure adding to a unity (1).

In middle school, students' exposure to teachers at the course level in the three core content areas was coded in the same manner as in the elementary grades, but based on the two semesters. A difference in our middle school coding process was that we did not force each core content area into equal weighting. Instead each core content area exposure contributed to a core content area total sum that formed the basis from which the weights were proportioned. Most commonly, a student had equivalent core instruction exposure in each of the three content areas (often two terms each). In that scenario, if a student had exposure to three different teachers, then each teacher would contribute one third (.33) of the overall core curriculum exposure and all other teachers in the sample would be coded as zero. However, in seventh grade the students often only had one semester of science. It was also occasionally the case that students would take both a core and an additional science course; in these cases, both science courses were included in the LDC analysis.

The weighting in middle school was always distributed as a proportion of the total semesters across the three content areas. Therefore, if a student accumulated one science unit

(one semester), two social studies units (two semesters), and two ELA units (two semesters), the base number of units would be five. Using that scenario, the science teacher would contribute one fifth (.20) of the overall core curriculum exposure with the social studies and science teachers contributing two fifths (.40) each, again resulting in the student's exposure adding to a unity. Tabular versions of the above examples can be found in Appendix H.

For this study, we modeled the treatment intervention variable as a fixed effect at the student level in two different ways. The first dosage-dependent approach takes into account the students' level of exposure to the intervention teachers. In this approach, the treatment was structured as a continuous response variable, coded as zero for comparison students and coded as a positive value for treated students, albeit never exceeding one. The positive value assigned to treated students in the dosage-dependent approach was simply the sum of the intervention teacher weights linked to the treated student. The second approach was dosage independent and classified any student exposed to an intervention teacher via at least one course as a treated individual. In this approach the treatment variable was dichotomous: coded as one for treated students and zero for comparison students.

Student Outcomes: Analysis Approaches

As with other multilevel models, MMMC accounts for the nonindependence of observations within cluster by adjusting the inferences on parameter estimates for the correlations between responses in a cluster. This modeling approach, however, becomes computationally cumbersome using traditional frequentist estimation methods. As recommended by Browne et al. (2001), to address this issue we employed Bayesian methods using Markov chain Monte Carlo (MCMC) techniques. Multilevel models incorporate demographic and achievement variables used in the matching design as covariates, making the findings "double robust" in that characteristics can be controlled for in both matching and outcomes analysis stages. Student demographic and baseline achievement variables that were used in the matching process were also included as covariates in the MMMC model. The full specifications for both models can be found in Appendix H.

In Chapter 7, we report on both the primary and supplementary analyses of the impact of LDC. Primary analyses focus on impacts after 2 years of teacher participation in LDC (for both Cohorts 1 and 2), and impacts after 3 years of teacher participation in LDC (for Cohort 1 only). Data from both cohorts were pooled for the primary analyses measuring impact after 2 years of implementation to increase statistical power and to produce more precise impact estimates. For the pooled analyses, the outcome year for Cohort 1 was spring 2018 and for Cohort 2 was spring 2019. To maximize the sample, we also conducted a primary analysis pooling schools, teachers, and students across both cohorts (Cohort 1 and Cohort 2) and school levels (elementary and middle). For this, we made the assumption that being exposed to LDC in all core content areas at the middle school level was equivalent to being exposed to a single teacher implementing LDC at the elementary level. This analysis was specified using only the dosage-independent version of the treatment variable.

The other primary analysis reported on in Chapter 7 examines the impact of LDC as implemented by Cohort 1 teachers with 3 years of LDC experience on student ELA scores in spring 2019. This analysis focuses exclusively on middle school students due to the lack of achievement scores for elementary school students in the 2015–2016 baseline year. We also report supplementary analyses examining (a) the impact of Cohort 2 teachers with 2 years of LDC experience (these groups of elementary and middle school teachers are subsamples of the pooled group of teachers in our primary analyses); and (b) the impact of LDC on subgroups of students broken down by whether they were exposed to LDC in the prior year, and how much LDC instruction they were exposed to in the outcome year. Analyses examining groups of teachers that joined existing LDC PLCs in later years were not conducted due to insufficient and limited teacher and/or student samples.

3.0 Survey Analysis

In this chapter we present the survey results. First, we summarize teachers' responses. We then summarize the teacher leaders' responses, followed by the administrators' responses. Within each of these sections, we organize results by the following domains: LDC participation; professional learning community and teacher collaboration; LDC training and support; LDC module implementation; leadership support; impact; and issues of scale-up and sustainability facilitators and barriers. The next section summarizes the open-ended responses regarding supports for implementation of LDC. We then present results of an exploratory analysis examining results across time (2018 and 2019) for three scales in which teachers rate the impact of LDC on themselves and their students. We end with a summary of results.

We use abbreviations to identify which participants answered specific questions for each domain. We preface teacher items with "T," teacher leader with "TL," and administrator questions with "A." For example, LDC Participation (T1–4) indicates that teacher survey items 1–4 are used to provide information on LDC participation. Survey questions and descriptive results are presented in full in Appendix A for teachers, Appendix B for teacher leaders, and Appendix C for administrators.

3.1 Teacher Survey Results

As noted earlier, 231 teachers spanning 33 schools completed the survey. Among the teachers who completed a survey, the largest proportion taught an elementary school grade while the smallest proportion taught at the high school level. More specifically, 65% of teachers taught in 22 elementary schools, 7% in two K–8 schools, 18% in 7 middle schools, 8% in one Grades 6–12 school, and 2% in one high school (see Table 3.1). When examining participation by cohort, 47 (20%) of the teachers were from Cohort 1 and 184 (80%) were from Cohort 2.

Table 3.1

Number of Schools and Teachers Completing the Survey in 2017–2018

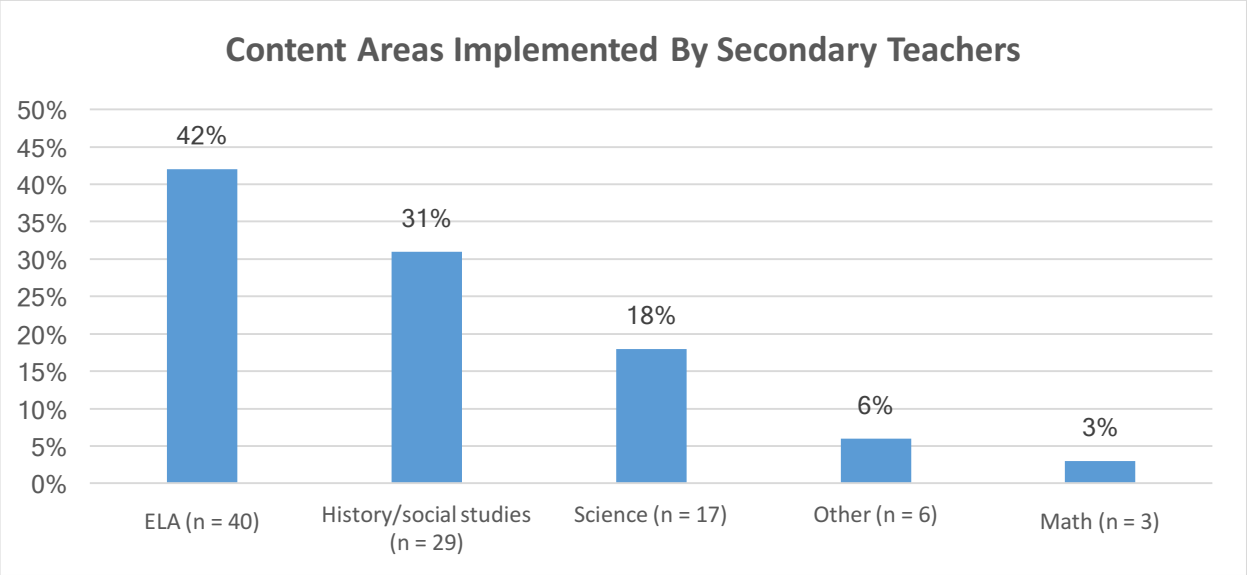
Cohort and start year	Elementary	K–8	Middle	6–12	High	Total
Number of schools	**22**	**2**	**7**	**1**	**1**	**33**
Number of teachers						
In Cohort 1 schools and started 2016–2017	13	0	8	0	2	23
In Cohort 1 schools and started 2017–2018	4	0	4	0	2	10
In Cohort 1 schools and started 2018–2019	10	0	4	0	0	14
In Cohort 2 schools and started 2017–2018	67	12	20	14	0	113
In Cohort 2 schools and started 2018–2019	55	5	6	5	0	71
Total	**149**	**17**	**42**	**19**	**4**	**231**

Among the 231 teachers who completed the survey, 149 reported teaching in an elementary school, and 82 reported teaching in a secondary school. The secondary teachers reported teaching one to seven classes (M = 4.78). In addition, the secondary teachers reported that they used LDC materials in zero to six classes (M = 2.86).[2] As shown in Figure 3.1, the distribution of LDC across content areas was 42% in ELA, 31% in history/social studies, 18% in science, 6% in other areas (e.g., health, Spanish), and 3% in mathematics.

[2]One teacher reported not using LDC materials in any classes.

Figure 3.1

Secondary Teachers' Content Areas Implemented



LDC Participation (T1–T4)

Approximately one third of responding teachers (34.6%) reported that 2018−2019 was their first year of implementing LDC, with the remaining two thirds (65.4%) having 1 or 2 years of previous experience. Among those who were returning to LDC, a great deal of variation was reported about their module implementation prior to the 2018−2019 school year (i.e., 2016−2017 and/or 2017−2018). More specifically, teachers reported implementing about two modules (*M* = 2.19, range = 0 to 10) and three mini-tasks outside of the context of a module (*M* = 2.78, range = 0 to 20) prior to 2018−2019.

Six of the seven teachers who did not participate in a PLC did report using LDC tools in their instructional planning or classroom instruction during the 2018−2019 school year. The most common activities for these six teachers involved using CoreTools to access existing modules or mini-tasks (*n* = 5) and design modules or mini-tasks (*n* = 5). Others stated that they received modules or mini-tasks from their coworkers (*n* = 4) or that they took an LDC online course (*n* = 3). Finally, one of the teachers reported that they did not implement because "My modules didn't have tools that I needed."

Professional Learning Community and Teacher Collaboration (T5–T9)

The vast majority of teachers (96%) participated in a PLC that at least partly focused on implementing LDC. Most of these teachers reported that their PLC met every other week (53%) or once a month (31%). The most common reasons stated for not meeting every week included other priorities that competed with LDC (43%), PLC time not being protected (17%), and limited interest in meeting (11%). The frequency of conversations about LDC that reportedly took place

outside of the PLC meetings typically ranged from once a week to once a month (84%). About two thirds of respondents (66%) stated that PLC meetings typically lasted 45−59 minutes with another quarter (26%) stating that they lasted 60−74 minutes.

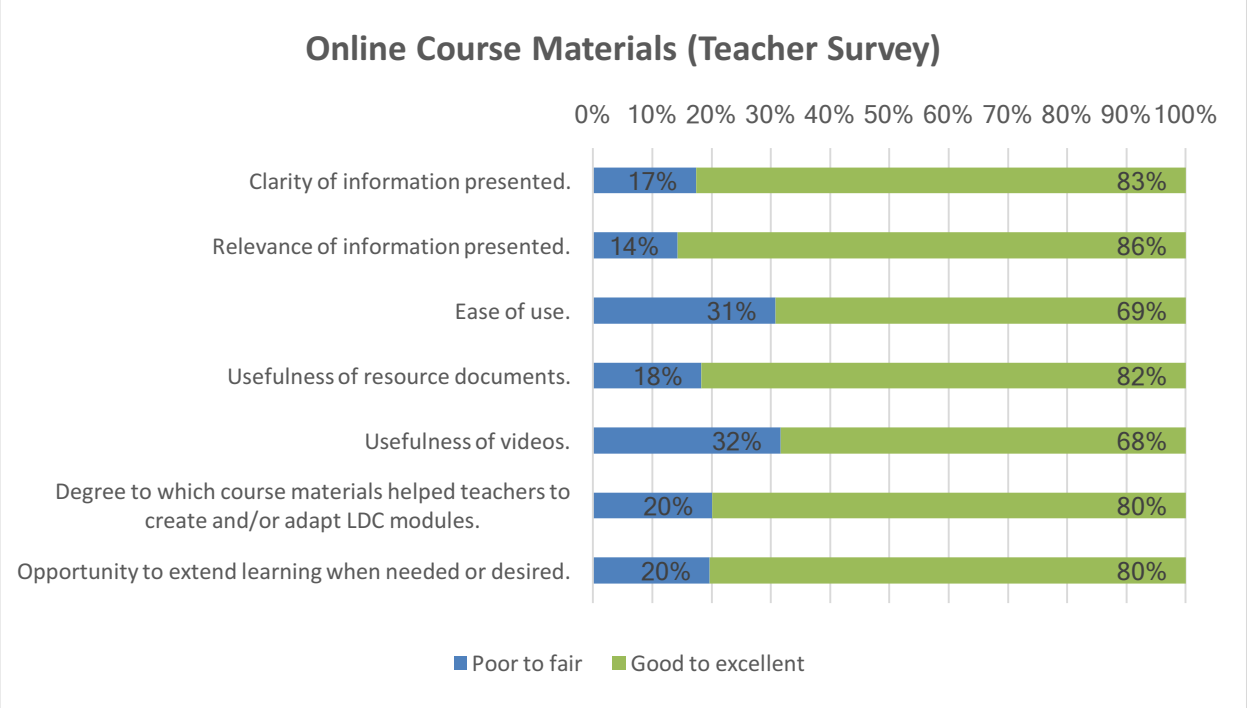
LDC Training and Support (T10–T13)

Approximately 90% of the teachers who responded stated that their PLC was moderately to very effective in all aspects listed on the survey. This included creating a comfortable working environment, fostering an environment for sharing instructional plans, helping teachers improve their LDC instructional plans, and allowing space for the sharing of student work.

Teachers were asked their opinions of the online course materials in the LEARN tab in LDC CoreTools (see Figure 3.2). Overall, more than two thirds of the teachers rated the materials as good to excellent on each aspect. Overall, teachers were particularly enthusiastic about the clarity and relevance of the information provided, with more than four out of five teachers rating these aspects as good or excellent. On the lower end, about one third of teachers gave a rating of poor or fair concerning the ease of use of the online course materials in general and the videos specifically.

Figure 3.2

Teacher Perceptions of Online Course Materials That LDC Coaches Used or Directed Their Teachers to Use



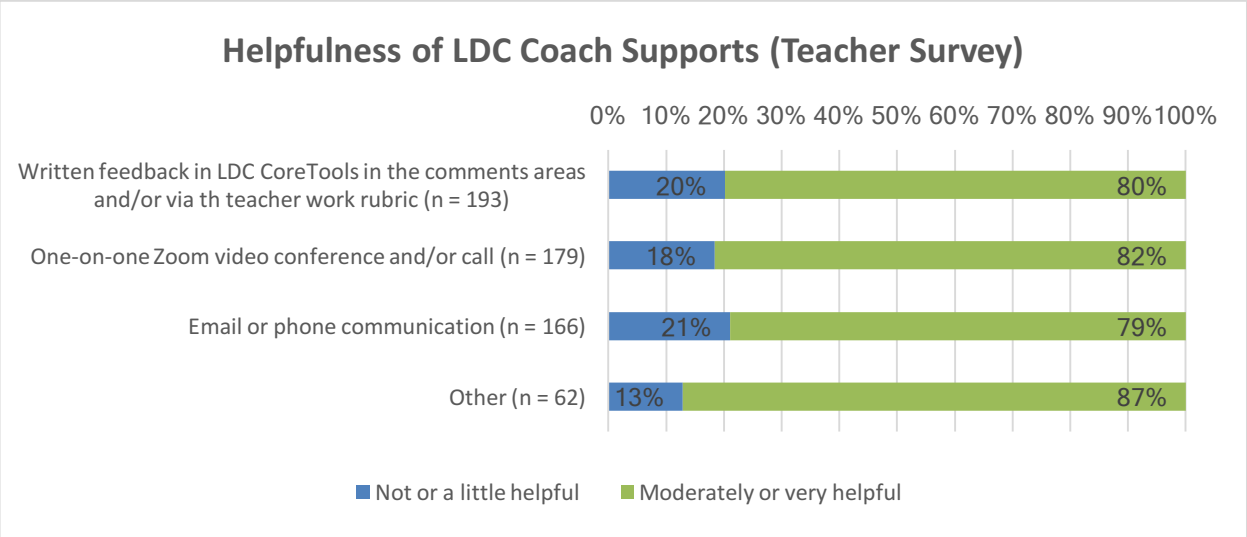
Note. n = 224.

Teachers were also asked to report on the supports that they received from their LDC coaches. When asked in general, almost all of the teachers reported that they were able to get

feedback and support from their LDC coaches (96%) either through CoreTools or in the PLC, including the receipt of written feedback in a timely manner (94%) through CoreTools. Despite this, when asked to rate the usefulness of the coaching, 14% of teachers indicated that they did not receive written feedback from their coach within LDC CoreTools. Of those who did report receiving the different supports, views were positive with more than three fourths of teachers reporting them as moderately to very helpful (see Figure 3.3). These included written feedback, Zoom video conferences, email or phone communication, or other sources of feedback.

Figure 3.3

Teacher Perceptions of the Different Types of LDC Coaching Supports



LDC Implementation (T14–T29)

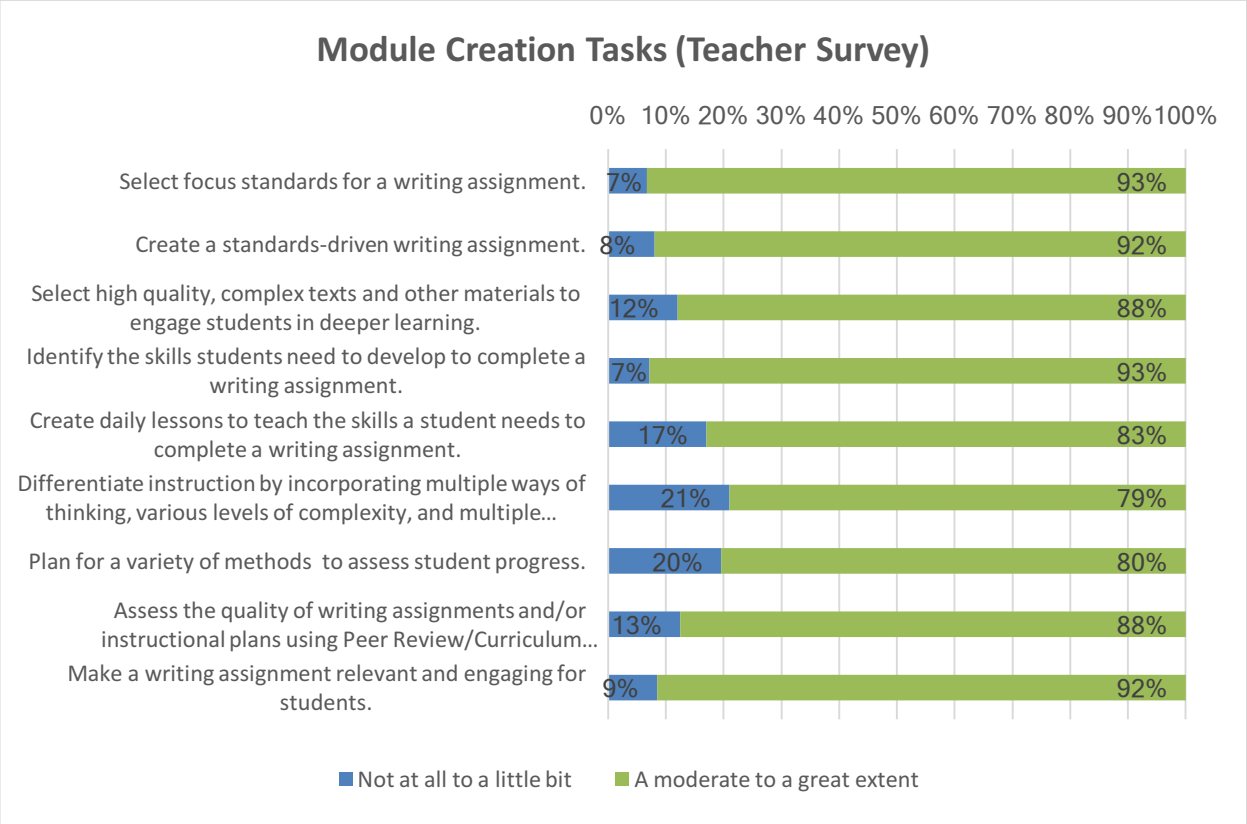
This domain covers questions on module creation (T14–17), module peer review (T27–29), and classroom implementation (T18–26).

Module Creation (T14–T17) and Module Peer Review (T27–T29). Teachers on average adapted (*M* = 1.83, range = 0 – 11) twice as many modules as they created (*M* = 91, range = 0 – 15). New modules were most likely to be created by teams of two or more teachers (62%), although some respondents reported doing the work with their PLC as a whole (21%) or on their own (32%). Most teachers (79% to 93%) also reported that they were able to accomplish most of the module creation tasks to a moderate or great extent. As can be seen in Figure 3.4, teachers were most likely to feel successful (i.e., a moderate extent to a great extent) with regard to selecting standards and creating standards-driven writing assignments, and identifying the skills students need to develop to complete the writing assignment. The tasks that teachers reported doing the least (i.e., not at all or a little bit) included differentiating instruction and planning a variety of methods to assess student progress.

Overall, the formal review process for modules seemed to be underutilized. First, only one third of the teachers (34%) who responded to the survey reported attending a peer review or curriculum alignment workshop during the 2018−2019 school year. Second, over 60% of teachers did not submit any modules for the LDC National Peer Review process. Despite this, the 83 teachers who did submit for peer review tended to find the process moderately to very helpful (69%), and only 8% found the process to be not helpful.

Figure 3.4

Extent to Which Teachers Completed Various Module Creation Tasks



Note. n = 224.

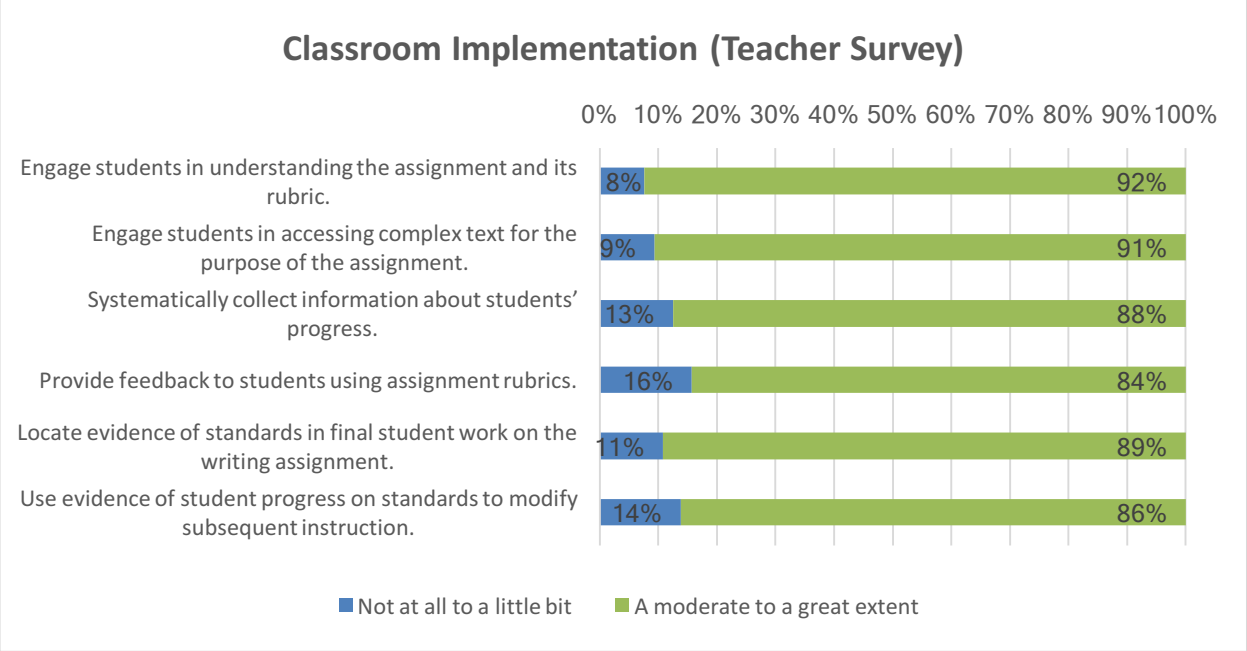
Classroom Implementation (T18–T26). Teachers seemed to implement fewer modules than they created or adapted. More specifically, teachers reported implementing about two modules (M = 2.16, range = 0 − 6) during the school year, and three additional mini-tasks outside of the context of a module (M = 3.33, range = 0 − 20). For many of the teachers (n = 144) this included implementing a "Find and Teach" module from CoreTools. More specifically, of those who did implement this type of module, the majority reported adapting the module (72%), with the remaining respondents implementing the module as it was found in CoreTools (28%).

Teachers were also asked to talk about later modules they created or adapted after completing the Find and Teach. In this case, about one third of teachers (31%) reported starting from a template in CoreTools with the remaining two thirds (69%) adapting an existing module found in the LDC Library. Furthermore, 87% of teachers reported that they had already implemented the module by the time they completed their survey. The remaining teachers were planning to implement later during the school year (7%), during the next school year (4%), or were not planning to implement at all (2%).

Finally, teachers were asked to report on what they were able to accomplish when teaching their LDC modules (see Figure 3.5). Overall, the vast majority of teachers (84% to 92%) reported accomplishing each of the activities listed to a moderate or great extent. Respondents were most likely to report confidence in engaging students in understanding the assignment and its rubric (92%) and accessing complex text (91%). The area where teachers seemed to have the most area to grow involved the providing of feedback to students using rubrics, with 2% reporting that they did not accomplish this at all and 14% reporting that they only accomplished this a little bit.

Figure 3.5

Activities Completed When Teaching LDC Modules



Note. n = 224.

Leadership Support (T33–T37)

This domain covers questions on teacher leader support (T33), administrator support (T34–36), and teacher leadership role in LDC (T37).

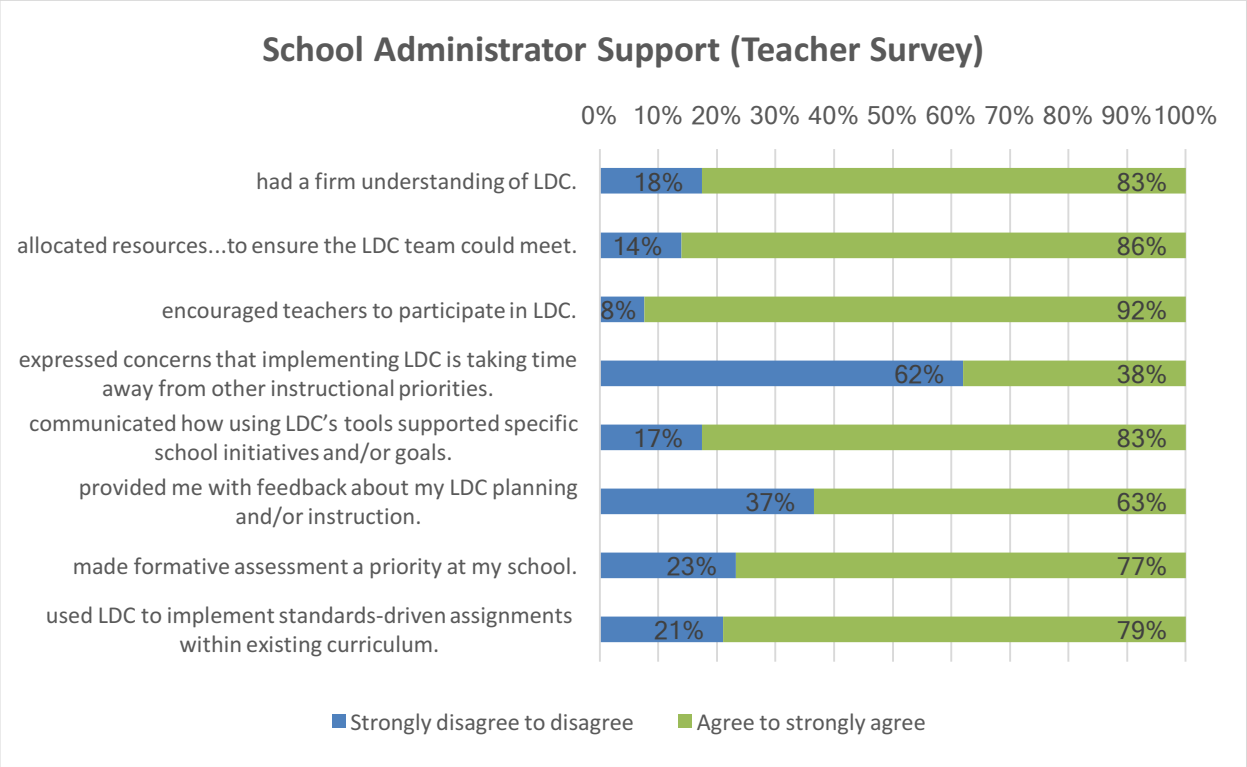
Teacher Leader Support (T33). Teachers were asked to report on the support received from the teacher leaders in their respective PLCs. In this case, teacher opinions were overwhelmingly positive, with more than 90% agreeing with each of the five types of support listed, and more than half strongly agreeing. More specifically, about two thirds of the teachers indicated that the teacher leader effectively supported the PLC meetings and created an atmosphere where they were comfortable asking for feedback. In addition, more than half strongly agreed that the teacher leader helped them to align LDC to the broader school instructional goals, provided useful feedback on the modules, and effectively invited teachers to join LDC.

School Administrator Support (T34–T36). According to teachers, administrators at many of the schools were engaged with the PLC. More specifically, 46% reported that their administrator attended the PLC meetings about three quarters or more of the time, 22% reported that their administrator attended about half of the meetings, and 32% reported that their administrator attended about one quarter or less of the time. Survey responses revealed that many teachers were not observed by their principals while implementing LDC in the classroom; 38% of the teachers reported that their administrator never observed them teach an LDC mini-task, 22% reported that they were observed once, and 40% reported being observed two or more times.

Teachers were also asked to rate the support LDC received from school administrators using a 4-point agreement scale ranging from *strongly disagree* to *strongly agree* (see Figure 3.6). Teachers generally agreed or strongly agreed that their school administrators supported LDC. For example, more than 80% of teachers indicated that their administrator had a firm understanding of LDC, allocated resources, encouraged teacher participation, and communicated how LDC supports specific school initiatives and/or goals. Most teachers (62%) also disagreed or strongly disagreed that their principal expressed concerns about LDC taking time away from other instructional priorities. This matches well with the view of most respondents that the LDC program aligned with school initiatives and/or goals.

Figure 3.6

Teacher Perceptions of School Administrator Support

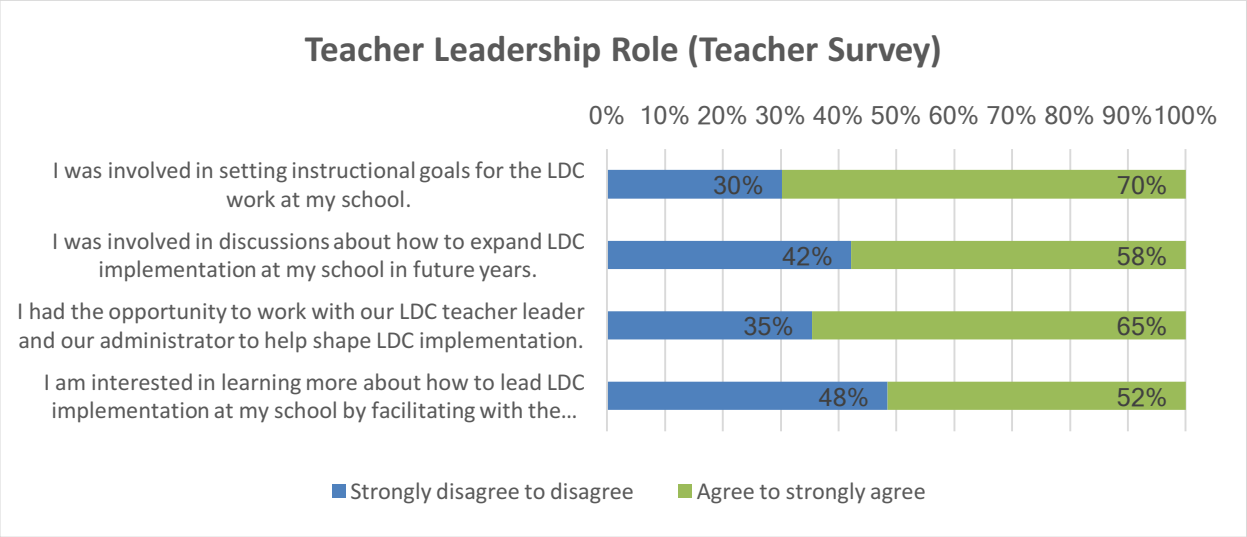


Note. n = 224.

Teacher Leadership Role (T37). Next teachers were asked to report on their own roles as LDC leaders at their schools. As can be seen in Figure 3.7, more than half of the teachers agreed or strongly agreed with each statement. The most commonly reported role (70%) involved helping to set instructional goals for the LDC work at their school. About two thirds of teachers also reported working with their teacher leader and administrator to shape implementation. The least reported role involved wanting to learn more about leading LDC implementation via virtual coaching, providing feedback, and so forth.

Figure 3.7

Role of Teachers in the Leadership of LDC at Their School



Note. n = 192.

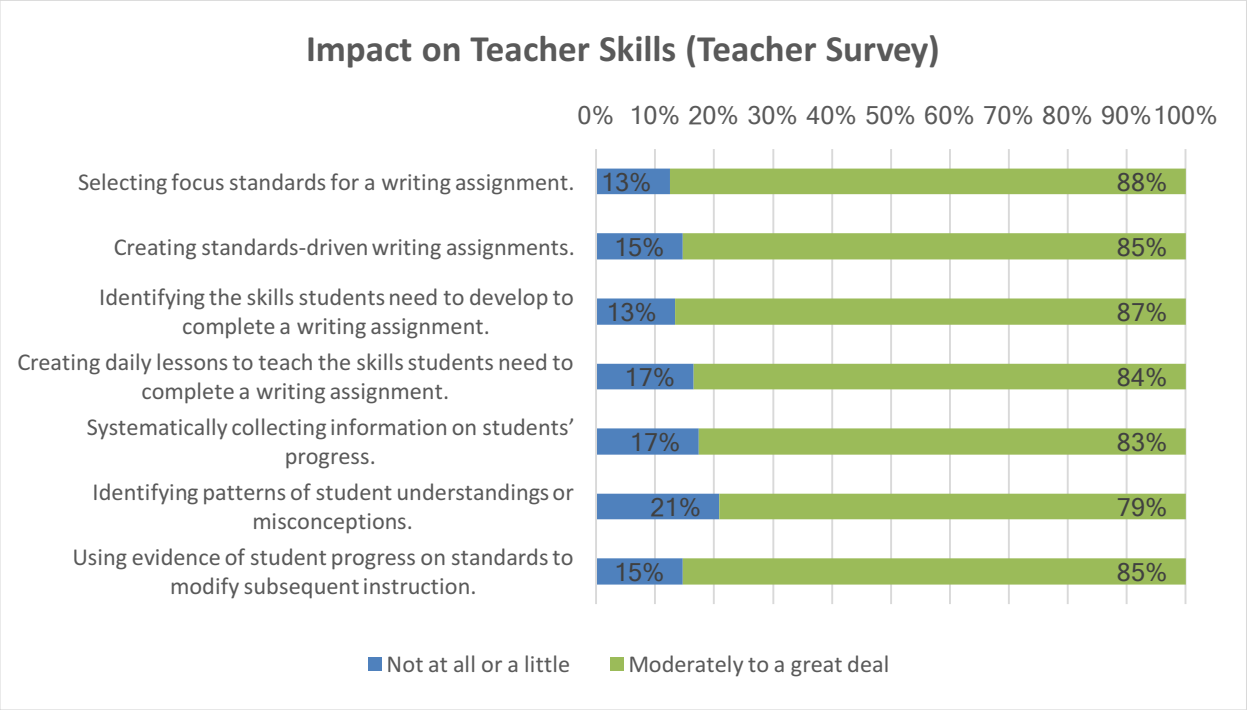
LDC Impact (T30–T32)

This domain covers questions on LDC impact on teacher practice and learning (T30–31) and student learning (T32).

Impact on Teacher Practice and Learning (T30–T31). Almost all respondents reported that their teaching skills improved during the 2018–2019 school year, and in most cases, this reflected moderate to a great deal of change (see Figure 3.8). The skills with the most ratings reporting a great deal of impact included selecting focus standards for a writing assignment, creating standards-driven writing assignments, and identifying the skills students need to develop to complete a writing assignment.

Figure 3.8

Teacher Perceptions of the Impact of LDC on Their Teaching Practice and Learning

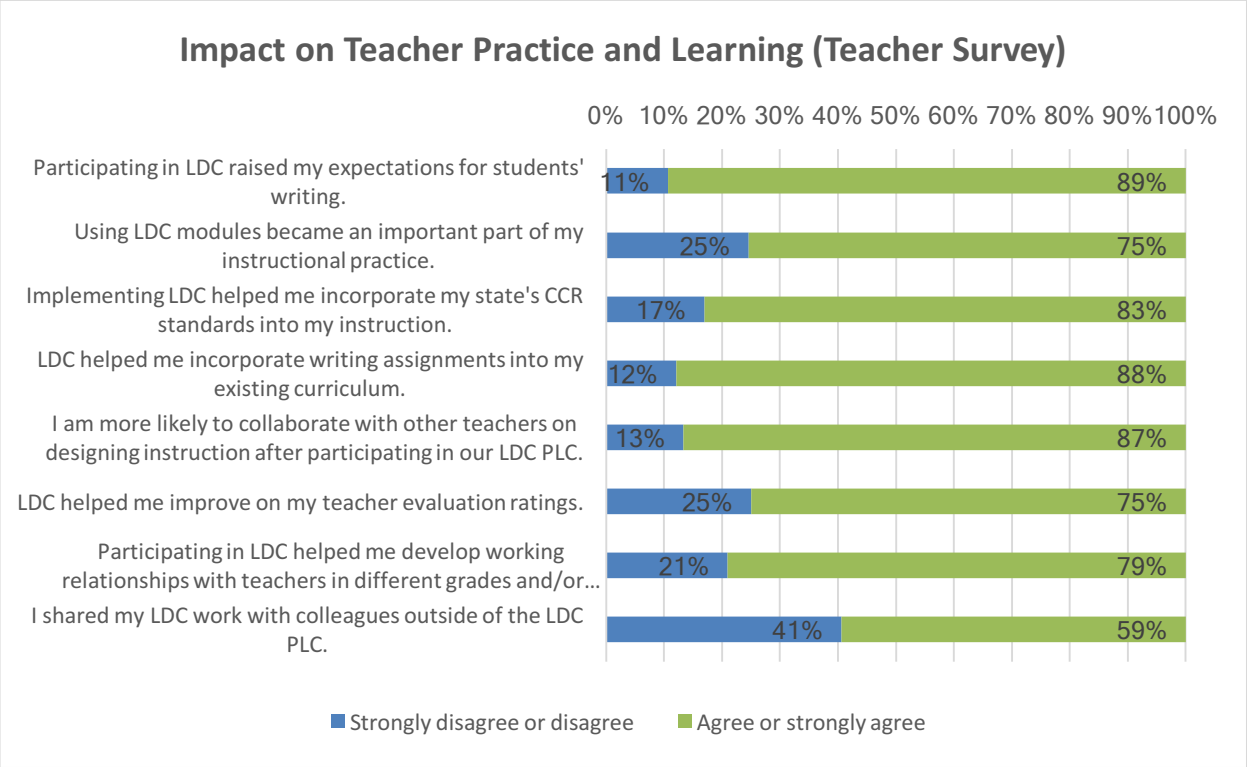


Note. n = 224.

Teachers were also asked their perceptions of the impact of LDC on a ranger of broader teacher practices using a 4-point agreement scale ranging from *strongly disagree* to *strongly agree*. As can be seen in Figure 3.9, the majority of teachers generally agreed or strongly agreed with the different impacts. More specifically, the vast majority of teachers agreed that LDC raised their expectations for students' writing (89%), and helped them learn how to incorporate writing assignments into their curriculum (88%). Furthermore, while 87% of teachers reported that they were now more likely to collaborate when designing instruction, only 59% noted that they shared their LDC work with colleagues who were not in their LDC PLC.

Figure 3.9

Teacher Perceptions of the Impact of LDC on Their Teaching Practice and Learning



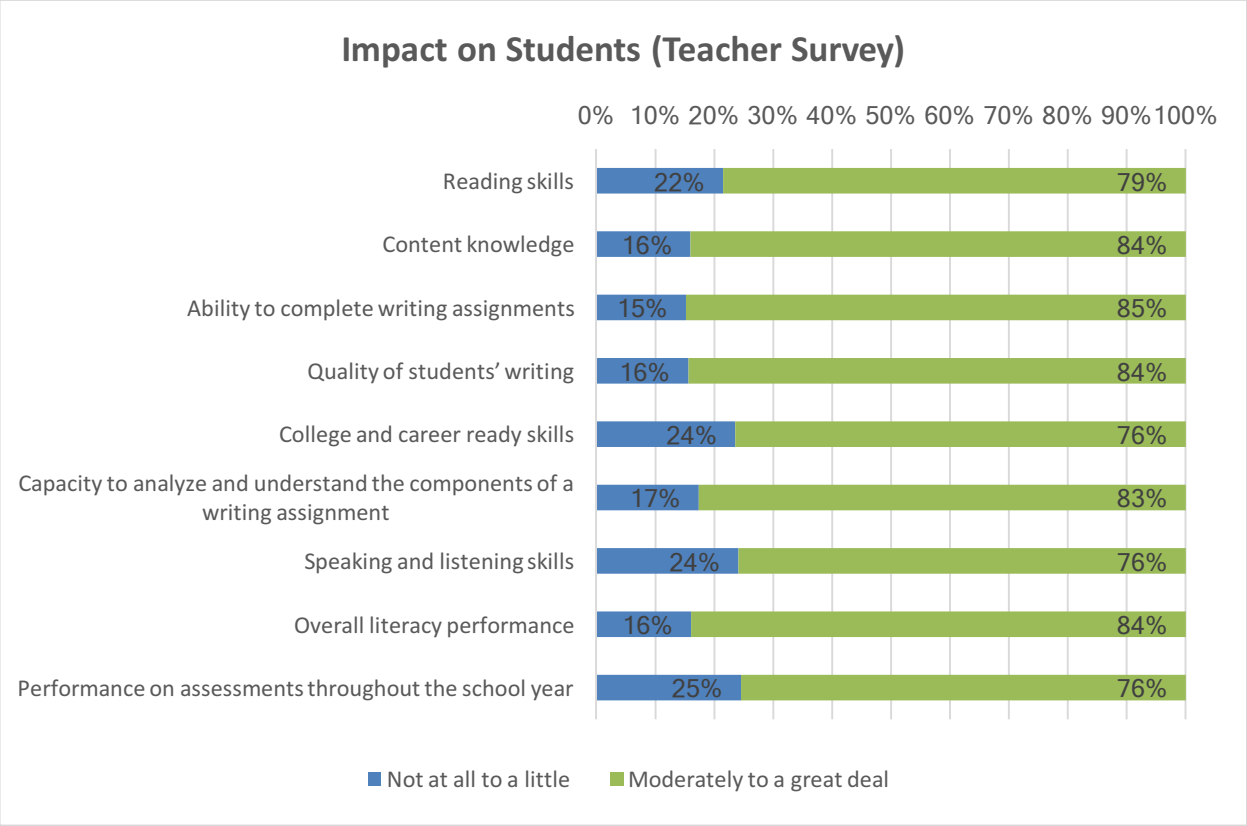
Note. n = 224.

Impact on Student Learning (T32)

Teachers were asked about the impact of LDC on their students using a 4-point scale ranging from *not at all* to *a great deal* (see Figure 3.10). Overall, very few of the teachers reported that their students received no positive effect in regards to any of the potential impacts listed (1% to 3%). The positive effects that teachers were most likely to endorse focused on writing and the obtaining of content knowledge. In contrast, teachers were more likely to say that their students only benefitted a little (18% to 25%) with regard to performance on assessments and other skills, such as reading, speaking and listening, and college and career readiness.

Figure 3.10

Teacher Perceptions of the Impact of LDC on Students



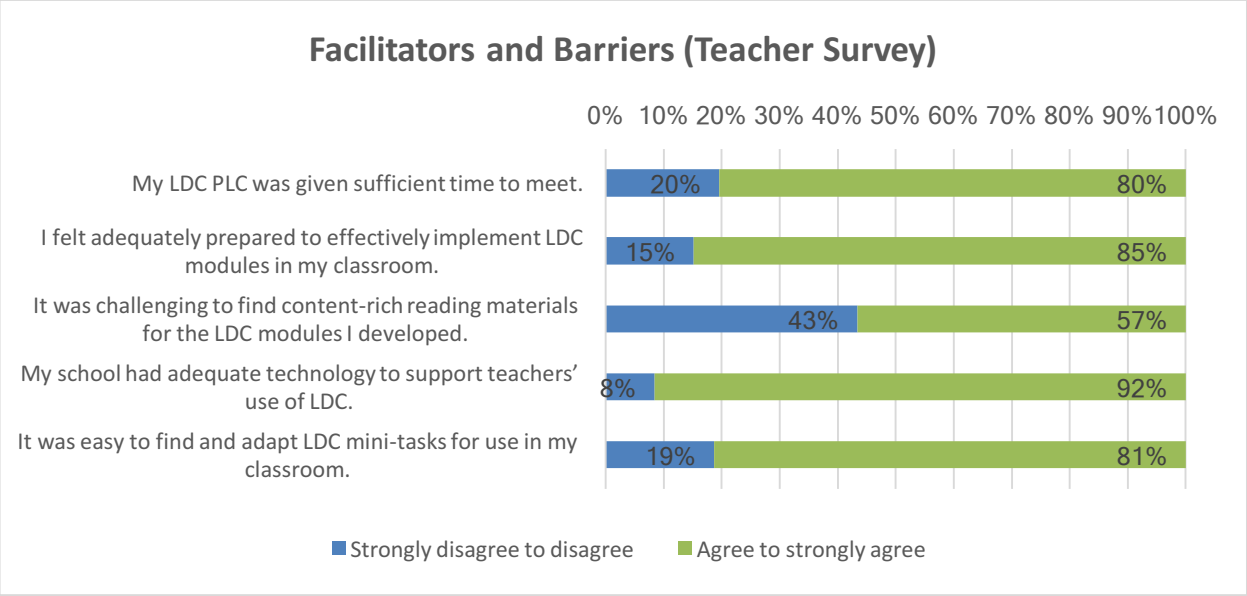
Note. n = 224.

Facilitators and Barriers (T38)

Teachers were asked to report on potential facilitators or barriers to the implementation of LDC (see Figure 3.11). Generally, the findings were positive. More specifically, more than 80% indicated that they had sufficient time to meet in their PLC, felt adequately prepared to implement modules, had adequate technology to support the use of LDC, and had an easy time finding and adapting mini-tasks to implement. More than half of the teachers, however, reported that it was challenging to find content-rich reading materials to support their modules.

Figure 3.11

Teacher Perceptions of Facilitators and Barriers to LDC Implementation



Note. n = 224.

3.2 Teacher Leader Survey Results

This section presents the survey results from teacher leaders. At each school, the teacher leader coordinated PLC meetings with LDC coaches. Teacher leaders were either classroom teachers or coaches/coordinators. A total of 37 teacher leaders responded to the survey.

LDC Participation (T1–2)

Only three of the 37 teacher leaders (8%) who responded to the survey reported that 2018−2019 was their first year of implementing LDC. The remaining teacher leaders (92%) all had 1 or 2 years of previous experience with the program. Among those who were returning to LDC, a great deal of variation was reported about module implementation during the 2016−2017 and/or 2017−2018 school years. More specifically, teacher leaders reported previously implementing about two modules (M = 2.38, range = 0 to 10) and three mini-tasks outside of the context of a module (M = 3.06, range = 0 to 16).

Professional Learning Community and Teacher Collaboration (TL3–TL6)

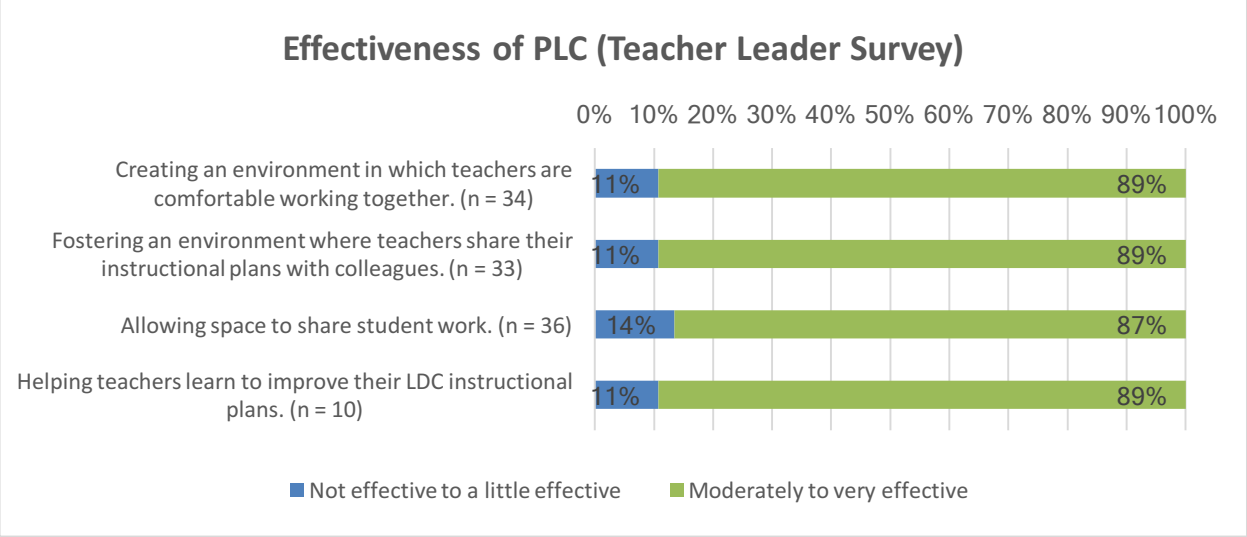
Most of the teacher leaders reported that their PLC met every other week (65%) or once a month (22%). The most common reasons stated for not meeting every week included PLC members having other priorities outside of LDC (46%), limited interest in attending meetings (27%), and PLC time not being protected (21%). According to teacher leaders, more informal conversations about LDC outside of the PLC meetings typically took place once a week to once a month (84%). More than half of respondents (60%) stated that PLC meetings typically lasted 45−59 minutes, with another third (32%) stating that they lasted 60−74 minutes.

Teacher Training and Support (TL7–TL12)

The vast majority of teacher leaders (87% to 89%) who responded stated that their PLC was moderately to very effective in all of the ways listed on the survey. This included creating a comfortable working environment, fostering an environment for sharing instructional plans, helping teachers improve their LDC instructional plans, and allowing space sharing of student work (see Figure 3.12).

Figure 3.12

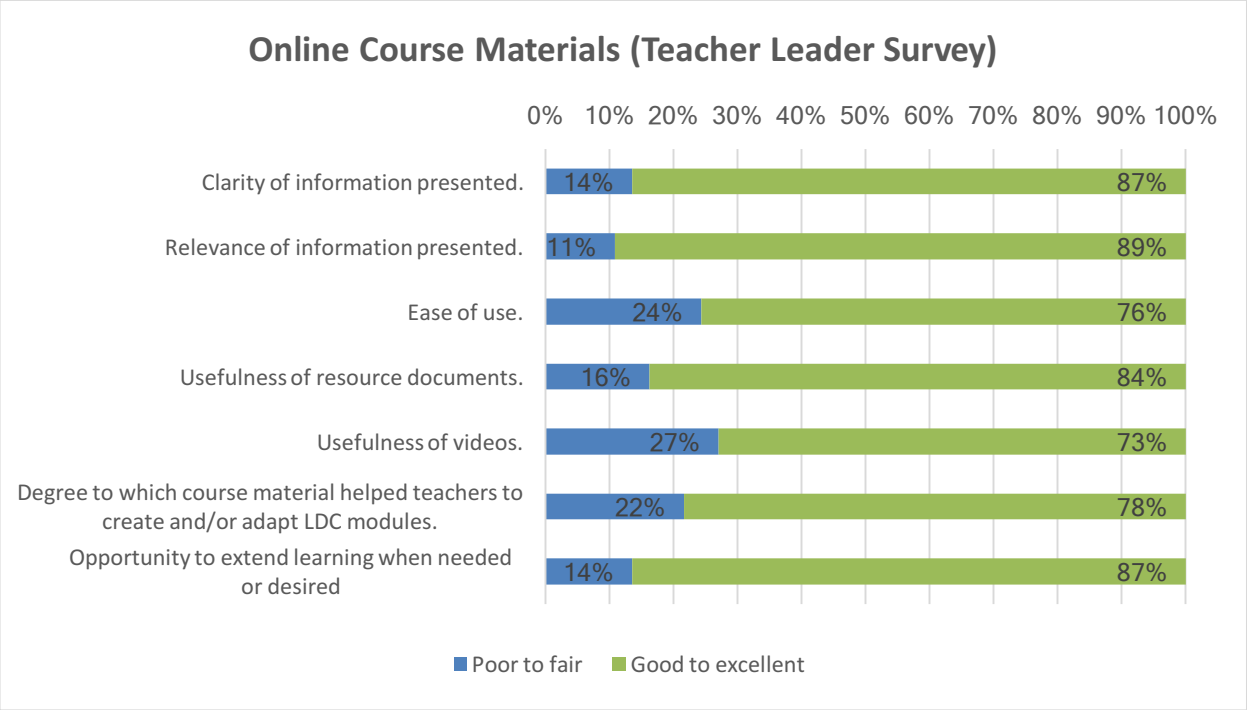
Teacher Leader Perceptions About PLC Effectiveness



Teacher leaders were asked their opinions of the online course materials in the LEARN tab in LDC CoreTools (see Figure 3.13). Overall, more than two thirds of the teacher leaders rated the materials as good to excellent. The most uniformly positive reactions were regarding the relevance of the information presented, the clarity of the information, and the opportunity to extend learning. Teacher leaders were somewhat less likely to highly rate the usefulness of videos and the ease of use of the site.

Figure 3.13

Teacher Leader Perceptions of the Online Course Materials in the LEARN Tab in LDC CoreTools



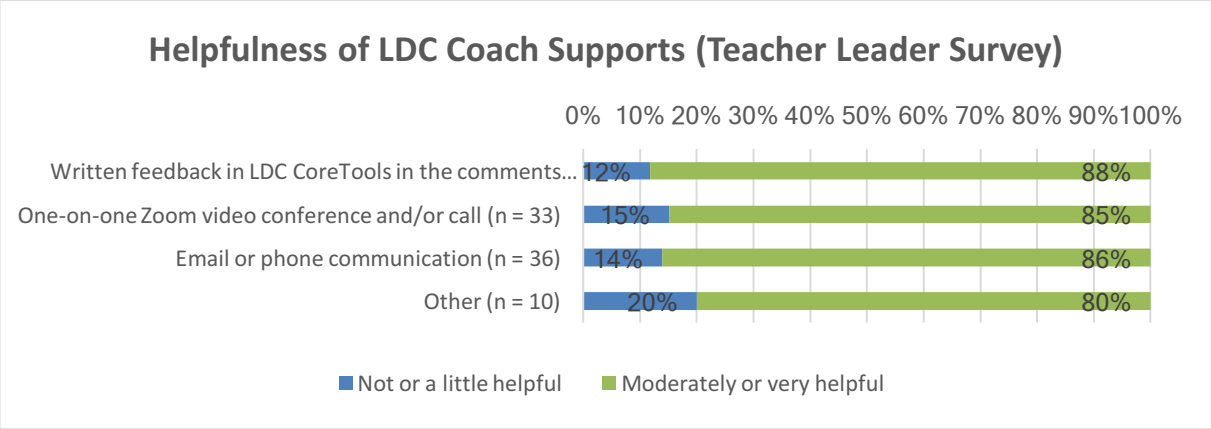
Note. n = 37.

Teacher leaders were also asked to report on the supports they received from their LDC coaches. When asked in general, almost all teacher leaders reported that they were able to get feedback and support from their LDC coach (97%) either through CoreTools or in the PLC, including the receipt of written feedback in a timely manner (97%) through CoreTools. Despite this, 8% reported that they did not receive written feedback in LDC CoreTools from their coach. Of those who did report receiving the different supports, views were positive with 80% or more of teacher leaders reporting them as moderately to very helpful (see Figure 3.14). These included written feedback, Zoom video conferences, email or phone communication, or other sources of feedback.

Teacher leaders varied in the amount of in-person and online professional development offerings that they received during the 2018–2019 school year. More specifically, while teacher leaders reported an average of participating in six professional development offerings, the actual numbers reported ranged from a low of zero to a high of 20.

Figure 3.14

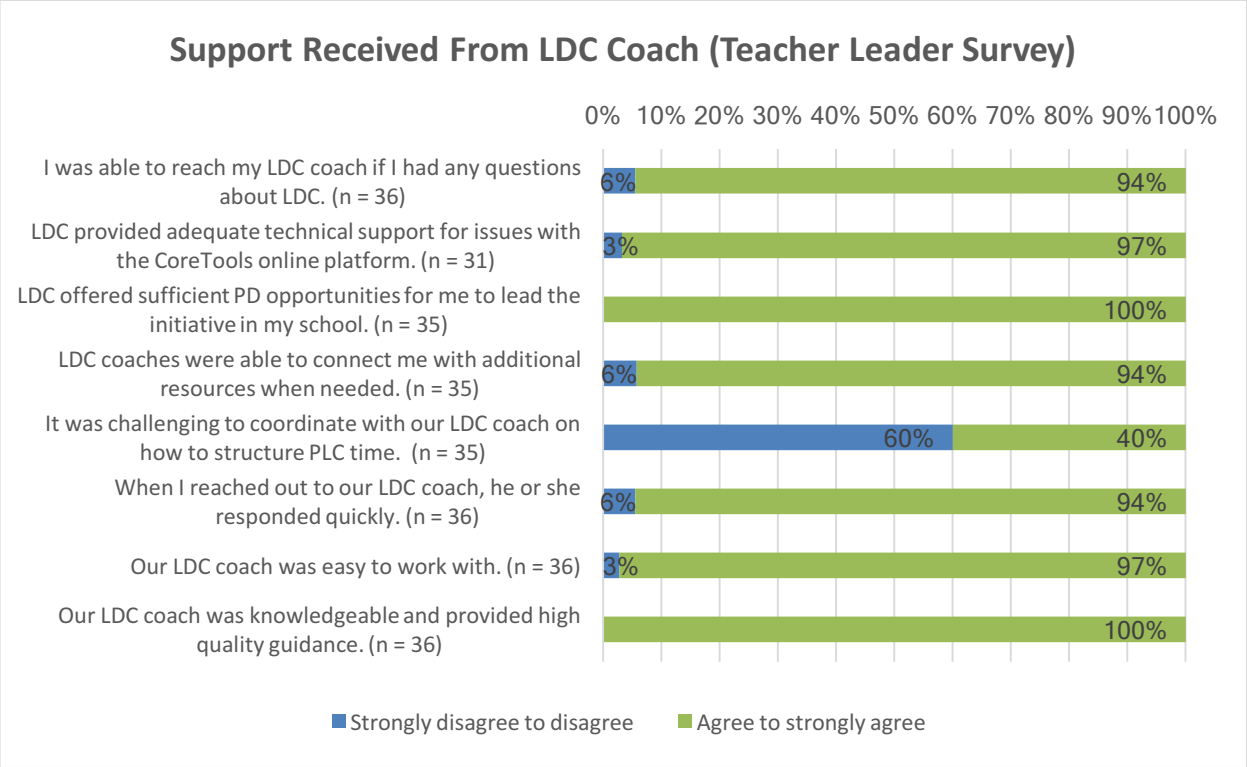
Teacher Leader Perceptions of the Different Types of LDC Coaching Supports



Teacher leaders were asked seven positively oriented items and one negatively oriented item concerning the support they received from their LDC coach (see Figure 3.15). As would be hoped for, almost all teacher leaders (94% to 100%) agreed or strongly agreed to the positively oriented statements. In contrast, only 60% of teacher leaders disagreed or strongly disagreed that it was challenging to coordinate with their LDC coach on how to structure PLC time.

Figure 3.15

Teacher Leader Perceptions of the Support They Received From the LDC Coaches



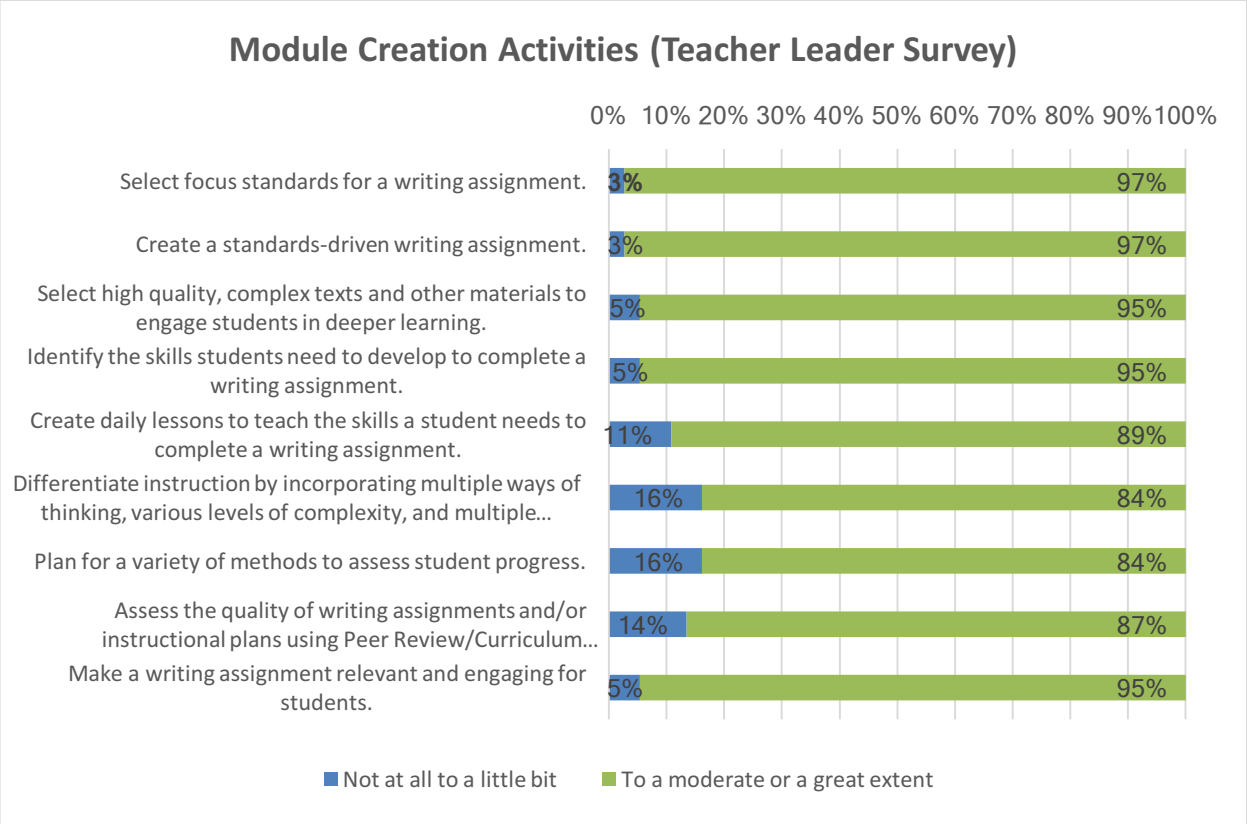
Note. n = 37.

Module Creation (TL13–TL16)

Teacher leaders generally adapted twice as many modules (M = 2.92, range = 0–12) as they created (M = 1.38, range = 0–6). New modules were most likely to be created by teams of two or more teachers (60%), although many reported creating modules individually (46%) or in their PLC as a whole (27%). As can be seen in Figure 3.16, almost all teachers felt successful with regard to each of the module creation tasks. Furthermore, more than 80% of all respondents agreed to a great extent that they were able to select focus standards for a writing assignment, create a standards-driven writing assignment, and/or identify the skills that students need to develop to complete a writing assignment. Teacher leaders were a little bit less likely to be confident in their ability to differentiate instruction, plan for student assessment, and assess student progress.

Figure 3.16

Teacher Leader Reports on Module Creation Activities



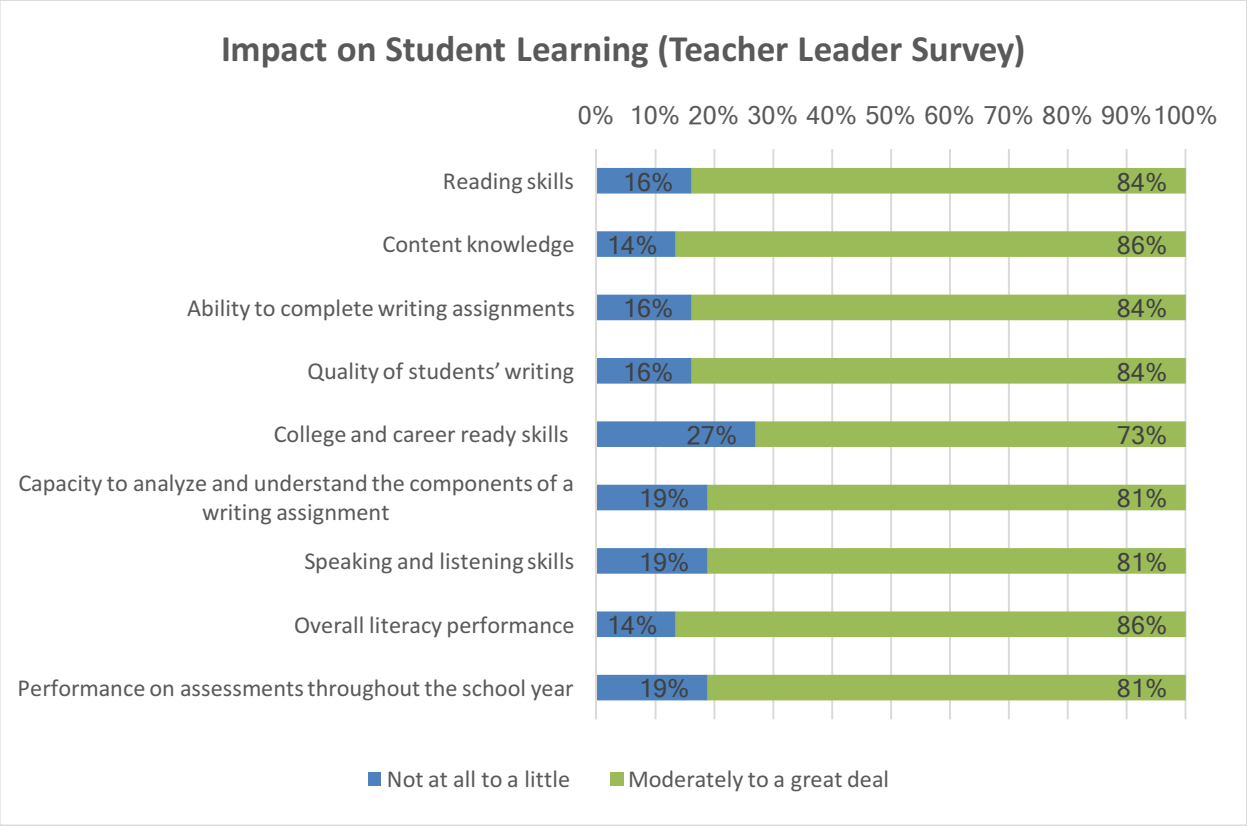
Note. n = 37.

Impact on Student Learning (TL17)

Teacher leaders were asked about the impact of LDC on student learning using a 4-point scale ranging from *not at all* to *a great deal* (see Figure 3.17). Overall, teacher leaders felt that students benefited from LDC. The only two items on which anyone reported *not at all* included reading skills (n = 1) and performance on assessments throughout the school year (n = 1). In addition, moderate percentages of teachers reported that their students only benefited a little with regard to acquiring college and career skills (27%), students' capacity to analyze and understand the components of a writing assignment (19%), and speaking and listening skills (19%).

Figure 3.17

Teacher Leader Perceptions of the Impacts of LDC on Student Learning



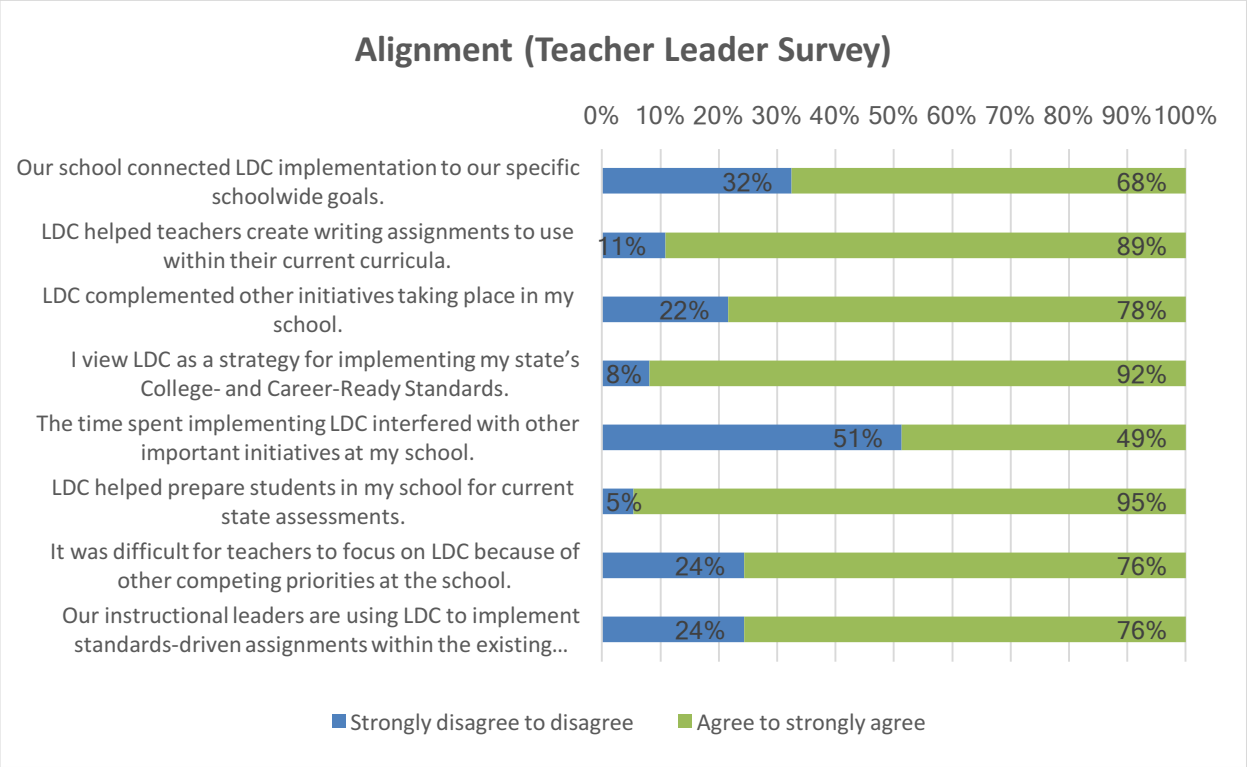
Note. n = 37.

Alignment (TL21)

Teacher leaders were also asked to rate their agreement about the alignment of LDC with the goals and initiatives at their schools (see Figure 3.18). In this case, two thirds or more of the teacher leaders agreed or strongly agreed with the seven positively framed statements. For example, the vast majority agreed that LDC helped prepare students for current state assessments (95%), was a strategy to implement the state standards (92%), and helped teachers create writing assignments within their curricula (89%). In addition, 68% of teacher leaders agreed or strongly agreed that LDC implementation was connected to the schoolwide goals. Finally, only about half of teacher leaders agreed with the negatively framed item, that is, that time implementing LDC interfered with other important initiatives at the school.

Figure 3.18

Teacher Leader Perceptions of the Alignment Between the School and LDC



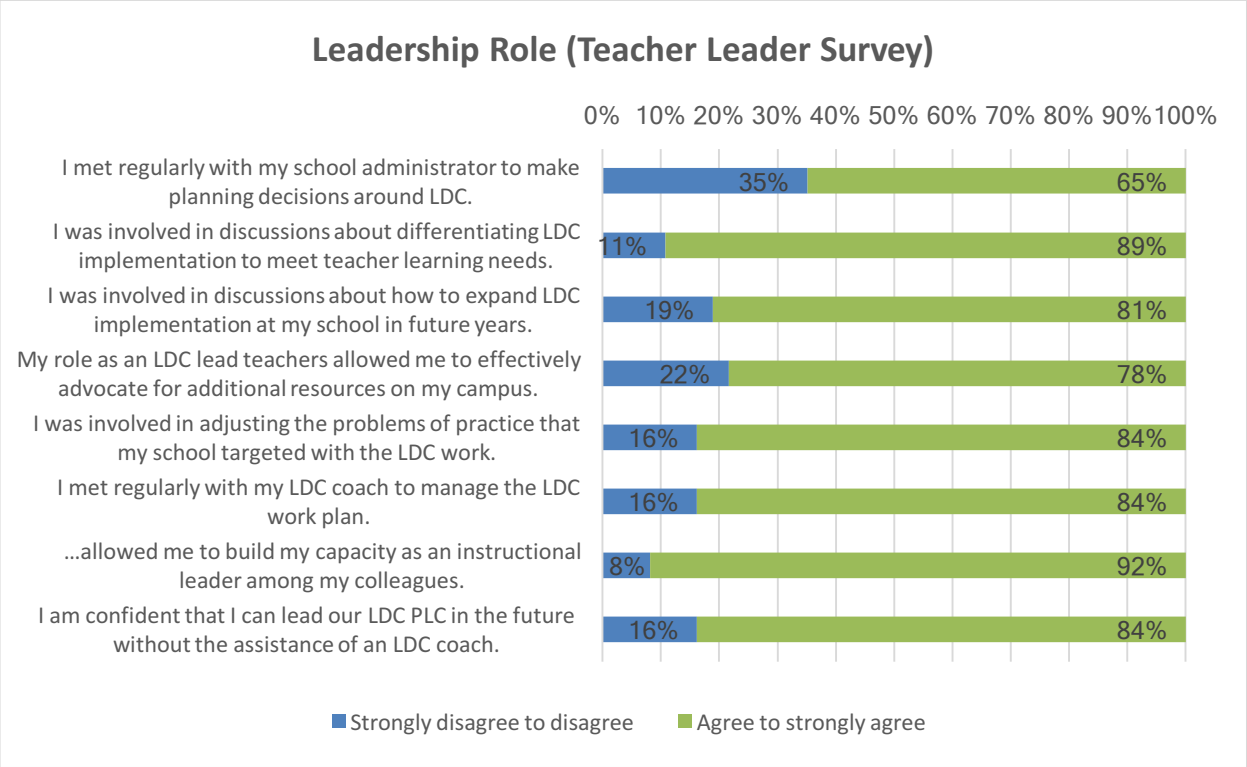
Note. n = 37.

Teacher Leader Leadership Role (TL20)

Next, teacher leaders were asked to report on their own roles as LDC leaders at their schools. As can be seen in Figure 3.19, more than three fifths of the teacher leaders (65% to 92%) agreed or strongly agreed with each statement. The most commonly reported roles involved building capacity as an instructional leader (92%) and differentiating LDC implementation to meet the learning needs of teachers (89%). The least reported roles involved meeting regularly with the school administrator to make planning decisions around LDC (65%) and being able to effectively advocate for additional resources on campus (78%). Finally, the only item on which someone strongly disagreed (n = 1) involved being able to lead the PLC without the assistance of an LDC coach.

Figure 3.19

Leadership Roles of the Teacher Leaders



Note. n = 37.

Leadership Support (TL18–19, T23)

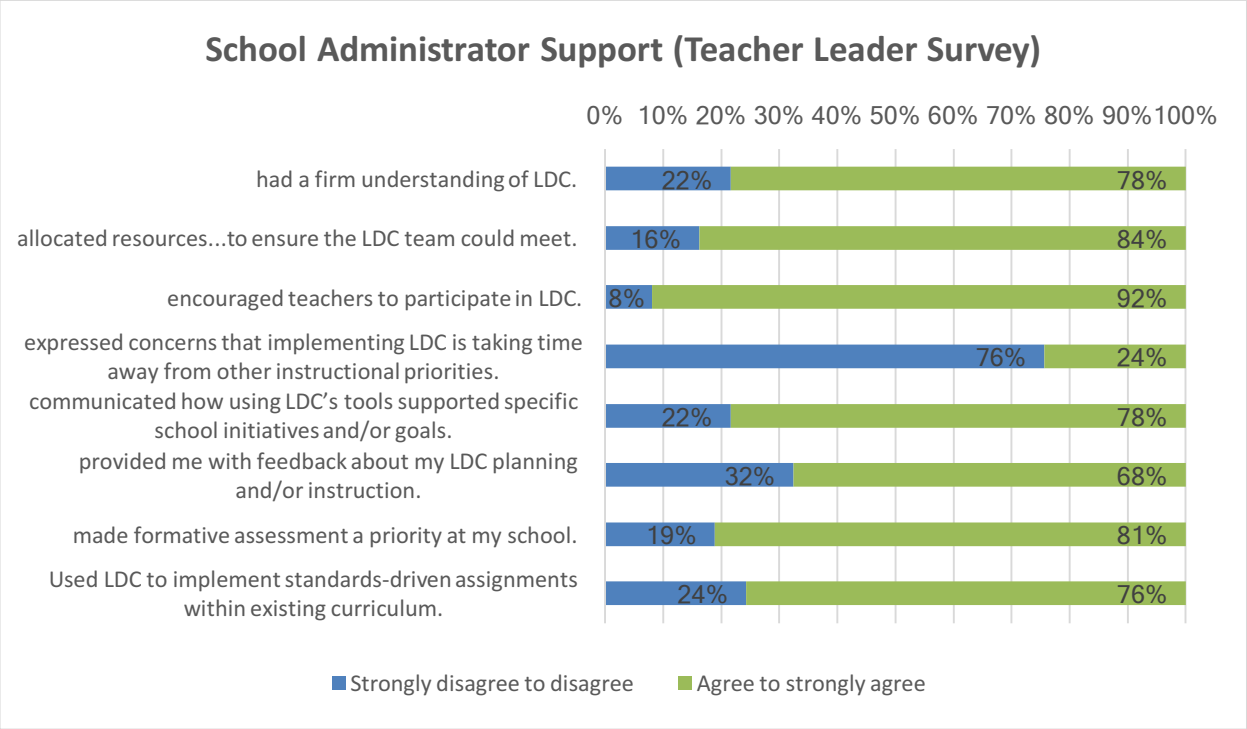
This domain covers questions on school administrator support (TL18–19) and district support (TL23).

School Administrator Support (TL18–TL19). According to teacher leaders, administrators at many of the schools were engaged with the PLC. More specifically, 41% reported that their administrator attended the PLC meetings about three quarters or more of the time, 24% reported that their administrator attended about half of the meetings, and 35% reported that their administrator attended one quarter or less of the time.

Next, teacher leaders were asked to rate the level of support that their school administrators provide to LDC (see Figure 3.20). Teacher leaders generally agreed or strongly agreed that their school administrators supported LDC. For example, more than 80% of respondents indicated that their administrator encouraged teachers to participate (92%), helped allocate resources to ensure that the LDC team could meet (84%), and made formative assessment a priority at the school (81%). Most teacher leaders (76%) also disagreed or strongly disagreed that their principal expressed concerns about LDC taking time away from other instructional priorities. This finding aligns well with the perception of most teacher leaders that LDC aligned with school initiatives and/or goals.

Figure 3.20

Teacher Leader Perceptions of School Administrator Support

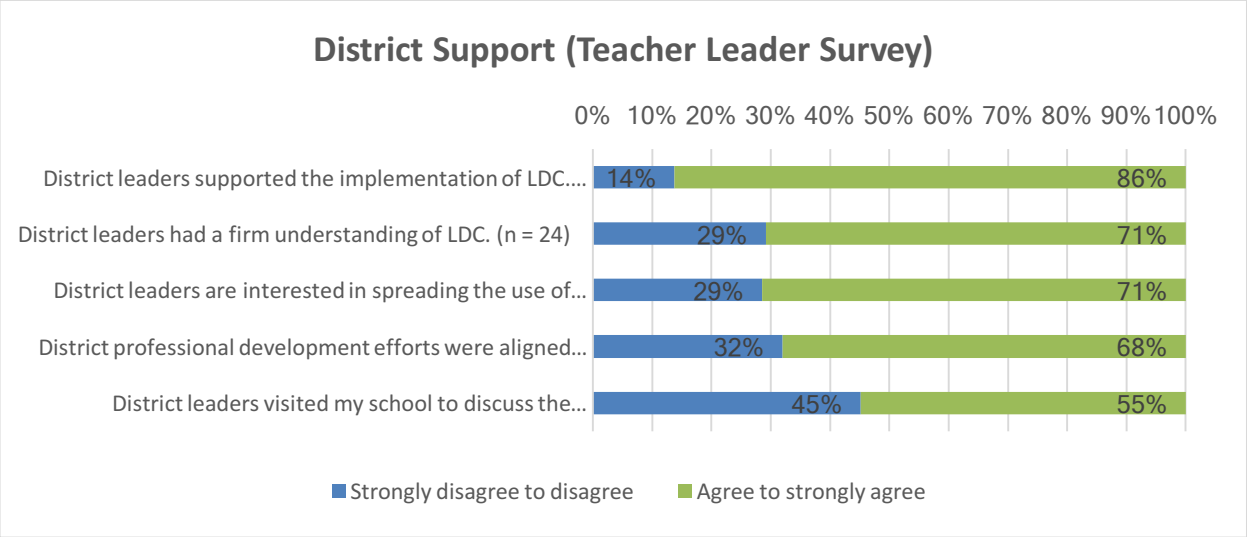


Note. n = 37.

District Support (TL23). Overall, teacher leaders had positive attitudes regarding district support towards LDC (see Figure 3.21). More specifically, 86% of respondents agreed or strongly agreed that district leaders supported LDC implementation. In addition, about 70% of respondents agreed or strongly agreed that district leaders had a firm understanding of LDC and were interested in expanding its use to other schools, and that LDC aligned with district professional development efforts. Finally, 55% reported that district leaders visited the school to discuss implementation.

Figure 3.21

Teacher Leader Perceptions of District Support of LDC



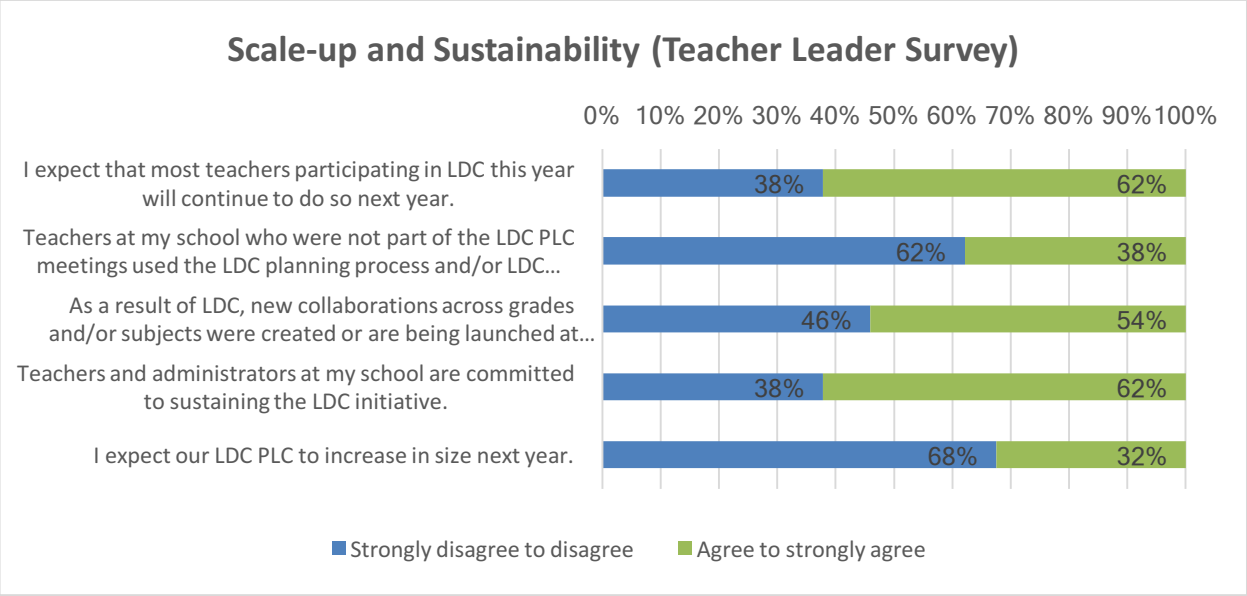
Note. n = 37.

Scale-up and Sustainability (TL22)

Teacher leaders showed mixed levels of agreement to five questions that focused on issues of scale-up and sustainability. Among the most positive results, more than half of respondents indicated that they expected most teachers to continue implementing LDC the next year (62%), believed that teachers and administrators were committed to sustaining LDC (62%), and felt that LDC led to new collaborations across grades and/or subjects (54%). In contrast, only 38% of respondents agreed or strongly agreed that the LDC planning process and/or CoreTools was used by teachers at their schools who were not part of the PLC meetings. Likewise, only 32% believed that their LDC PLC would increase in size during the next school year (see Figure 3.22).

Figure 3.22

Teacher Leader Perceptions of the Scale-Up and Sustainability of LDC



Note. n = 37.

3.3 Administrator Survey Results

In total, 35 school administrators spanning 29 schools (out of 34 total participating in LDC in 2018–2019) completed the survey. This included 23 principals, eight assistant principals, and four others (e.g., counselor, coordinators, and a principal designee).

Professional Learning Community (A2)

Administrators varied in the proportion of the PLC meetings that they attended. More specifically, 40% reported that they attended about three quarters or more of the meetings. In addition, 23% reported that they attended half of the meetings and another 20% reported attending about one quarter. Finally, 17% indicated that they attended less than one quarter of the PLC meetings. It is not clear from the question whether any of the administrators failed to attend at all.

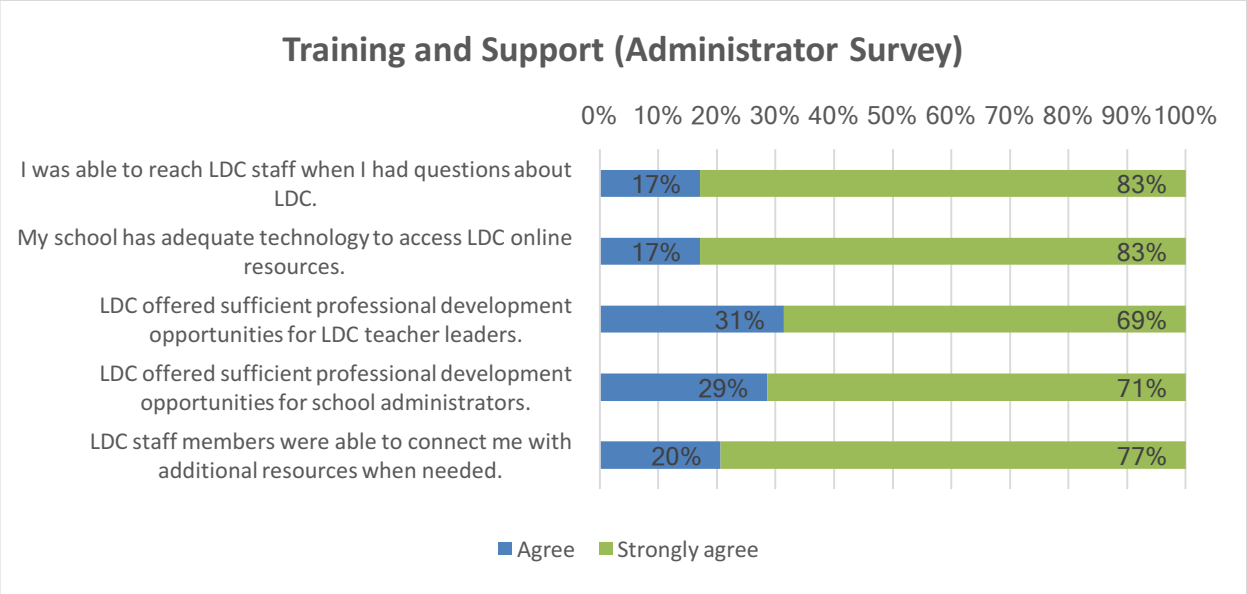
Training and Support (A3–A4)

When asked about issues of training and support, all administrators who responded to the survey agreed or strongly agreed to each statement (see Figure 3.23). The strongest levels of agreement focused on whether the administrators were able to reach LDC staff when they had questions (83%), there was adequate technology to access online resources (83%), and LDC staff were able to connect with them when they needed additional resources (77%). Finally, more than two thirds reported that they and their teacher leaders each had sufficient PD opportunities (71% and 69%, respectively). Furthermore, while administrators attended an

average of five in person and/or online professional development sessions, some participated a great deal more or less (1 to 20).

Figure 3.23

Administrator Perceptions of Training and Support



Note. n = 35.

Classroom Observation (A5–6)

Thirty-three of the 35 administrators who responded to the survey indicated that they observed each member of their PLC teaching an LDC module. Overall, the most common response among administrators was three or more observations per teacher (40%), with about one third only observing once each (34%), and the remaining reporting observing each teacher twice (20%). In addition, administrators were asked how effective they thought the modules they observed were at helping students develop literacy skills. Almost all perceived that the modules were moderately (46%) or very effective (48%), with only two administrators (6%) deeming it to be only a little effective. None of the administrators reported that the modules were not effective in helping develop students' literacy skills.

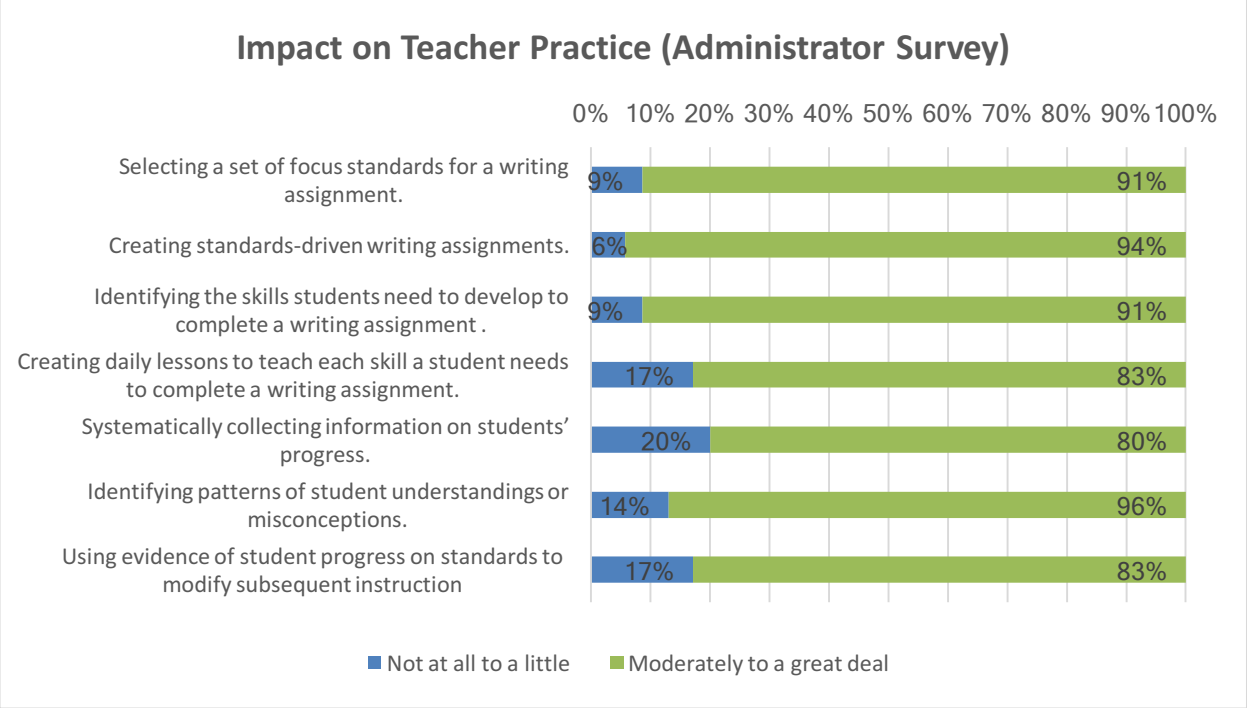
Impact on Teacher Practice (A7)

Administrators were asked their perceptions about the level and types of impact that LDC had on teacher practice at their PLC (Figure 3.24). Overall, perceptions were positive with 80% to 96% of administrators indicating that LDC had a moderate to a great deal of impact on teachers, depending on the practice. Administrators were most likely to report a positive impact on teachers' ability to identify patterns of student understandings or misconceptions (96%), ability to create standards-driven writing assignments (94%), and ability to select focus standards and identify skills for writing assignments (91%, respectively). Administrators were

somewhat less likely to perceive an impact on teachers' ability to collect information systematically on students' progress (80%).

Figure 3.24

Administrator Perceptions of the Impact of LDC on Teacher Practice



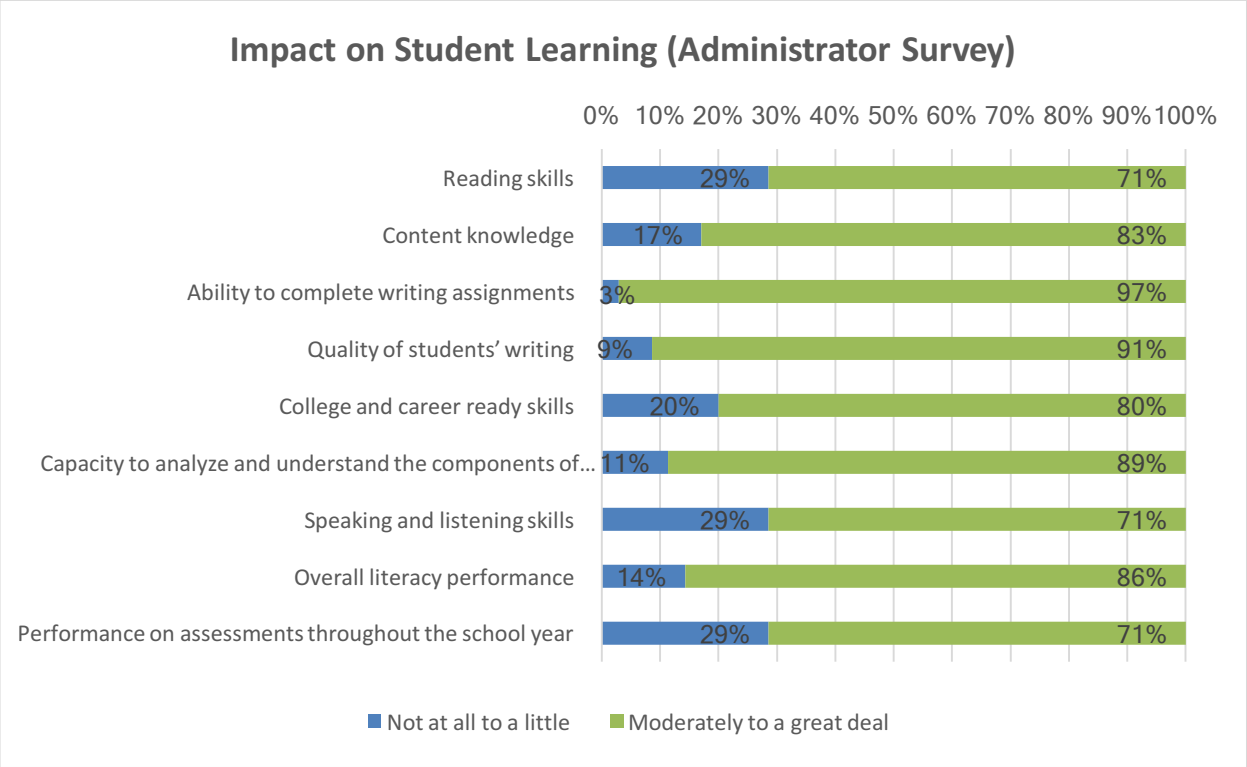
Note. n = 35.

Impact on Student Learning (A8)

Administrators also perceived a variety of positive impacts on the students whose teachers implemented LDC (Figure 3.25). For example, most indicated that LDC had a moderate to a great deal of impact on students' writing including completing assignments (97%), the quality of the work (91%), and their capacity to analyze and understand the components of a writing assignment (89%). The areas where administrators were the least likely to perceive positive impacts (71%) included reading skills, speaking and listening skills, and/or performance on assessments throughout the school year.

Figure 3.25

Administrator Perceptions of the Impact of LDC on Student Learning



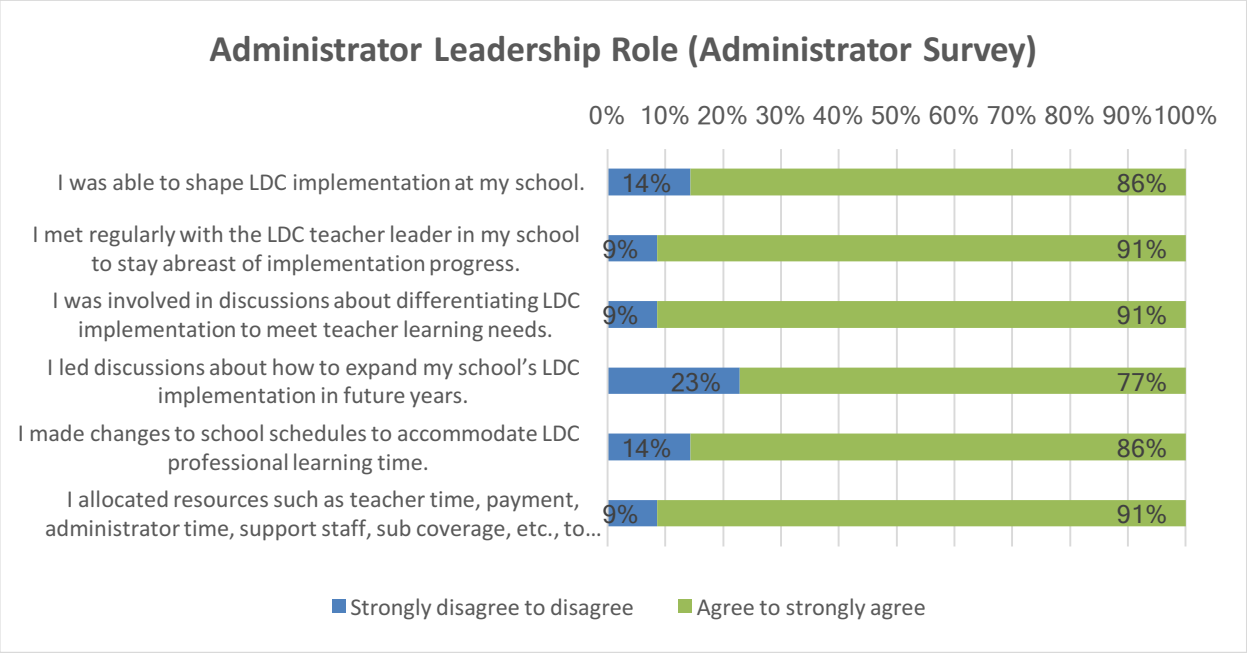
Note. n = 35.

Administrator Leadership Role (A9)

Next, administrators were asked to report on their own roles as LDC leaders at their schools. As can be seen in Figure 3.26, more than three fourths of the administrators who responded (77% to 91%) agreed or strongly agreed with each statement. The most commonly reported roles involved meeting with the teacher leader to stay abreast of implementation progress, participating in discussions about how to differentiate LDC implementation, and allocating resources (91% in each case). In addition, 86% agreed or strongly agreed that they were able to shape LDC implementation at their school and/or make changes to school schedules to accommodate LDC professional learning time. Finally, the least common role (77%) involved discussing how to expand implementation during future school years.

Figure 3.26

Administrator Perceptions of Their Leadership Role With LDC



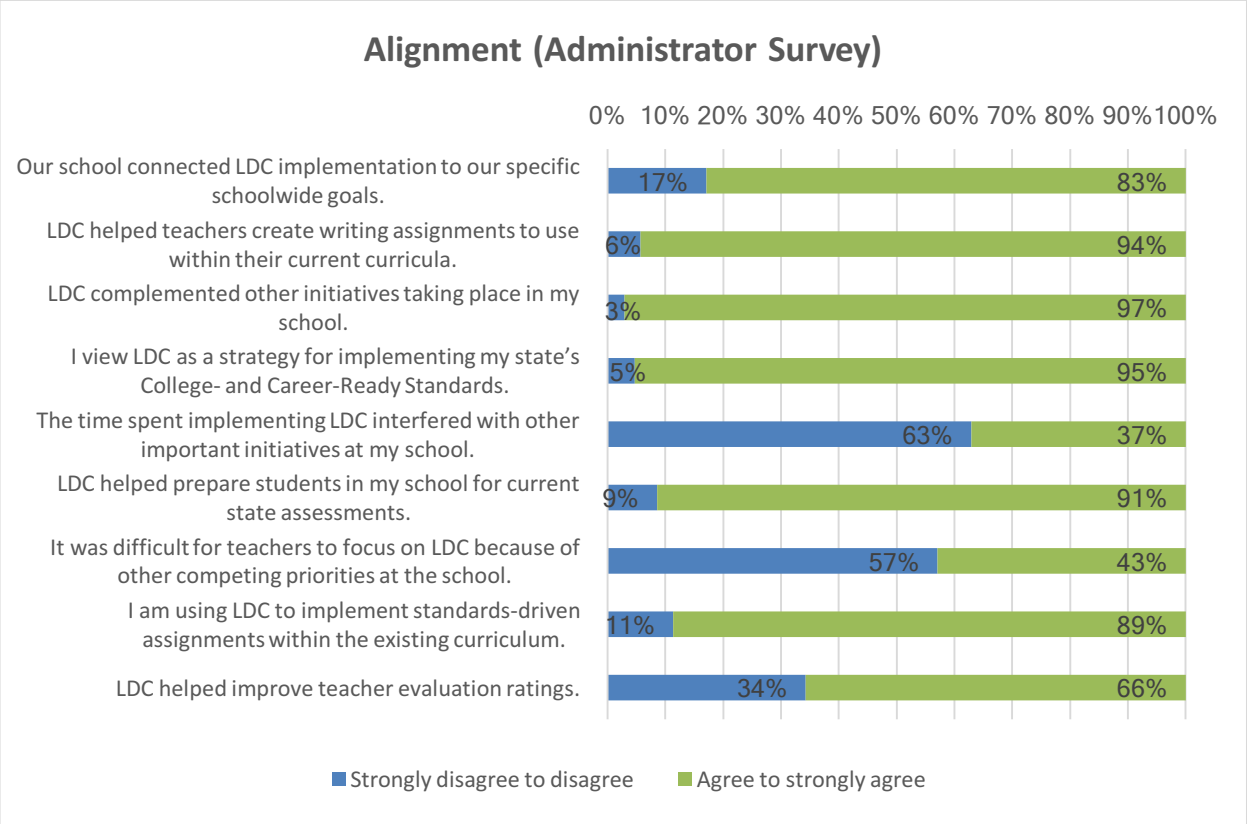
Note. n = 35.

Alignment (A10)

Administrators were also asked to rate their agreement about the alignment of LDC with the goals and initiatives at their schools (see Figure 3.27). Two thirds or more of the administrators agreed or strongly agreed with the seven positively framed statements. For example, the vast majority agreed that LDC complemented other initiatives at their schools (97%), was a strategy for implementing the state standards (95%), helped teachers create writing assignments within their curricula (94%), and prepared students for state assessments (91%). Finally, less than half of the administrators agreed with the two negatively framed items, that is, that time implementing LDC interfered with other important initiatives at the school (37%) and that it was difficult to focus on LDC because of other school priorities (43%).

Figure 3.27

Administrator Perceptions of LDC Alignment With the School



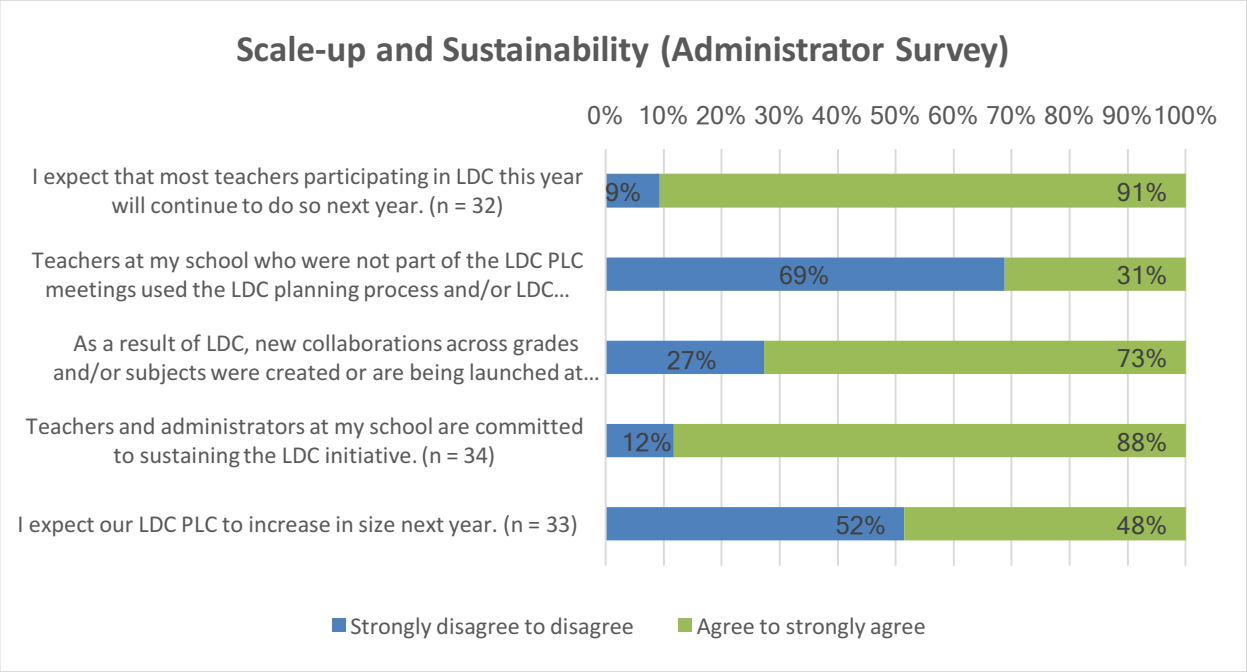
Note. n = 35.

Scale-up and Sustainability (A11)

As can be seen in Figure 3.28, administrators showed mixed levels of agreement to the five questions that focused on issues of scale-up and sustainability. Among the most positive results, more than two thirds of respondents indicated that they expected most teachers to continue implementing LDC the next year (91%), believed that teachers and administrators were committed to sustaining LDC (88%), and felt that LDC led to new collaborations across grades and/or subjects (73%). In contrast, only 31% of respondents agreed or strongly agreed that the LDC planning process and/or CoreTools was used by teachers at their schools who were not part of the PLC meetings. Finally, only 48% believed that their LDC PLC would increase in size during the next school year.

Figure 3.28

Administrator Perceptions of the Scale-up and Sustainability of LDC

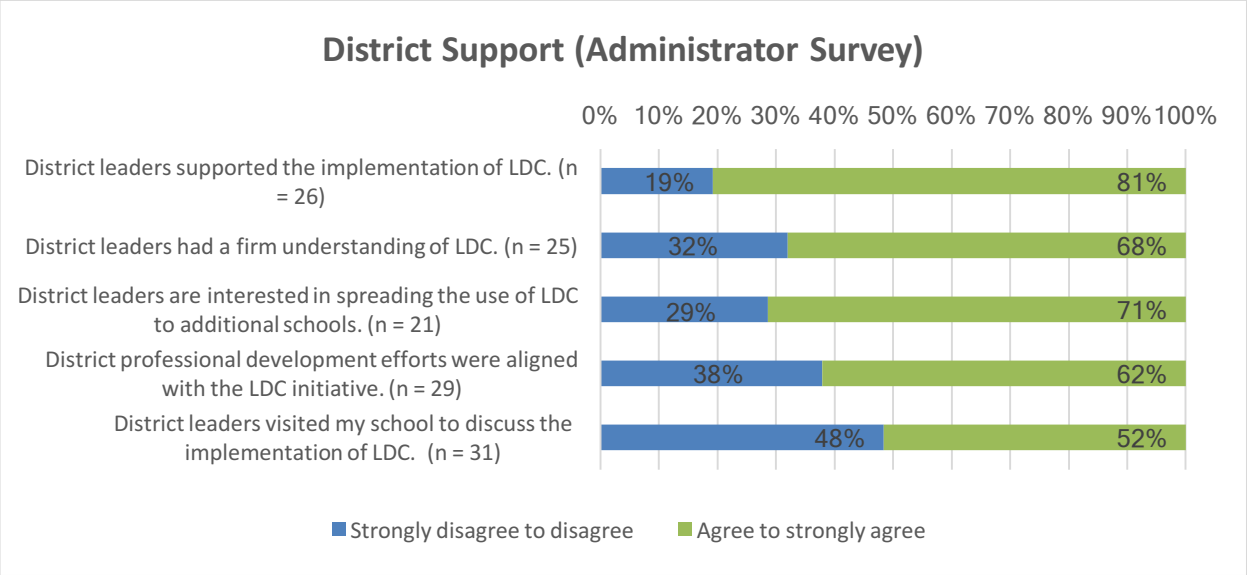


District Support (A12)

Overall, administrators had positive attitudes regarding district support towards LDC (see Figure 3.29). More specifically, 81% of respondents agreed or strongly agreed that district leaders supported LDC implementation. In addition, a little over two thirds agreed or strongly agreed that district leaders were interested in expanding its use to other schools (71%) and/or that district leaders had a firm understanding of LDC (68%). Finally, 62% felt that district professional development efforts were aligned with LDC and 52% indicated that district leaders visited the school to discuss LDC implementation.

Figure 3.29

Administrator Perceptions of District Support of LDC



3.4 Open-Ended Responses for All Participants

Each survey respondent was asked three open-ended questions regarding the supports they received for the implementation of LDC at their school: (a) What supports did you find the most useful and why? (b) What supports were not helpful and why? and (c) In what ways could LDC implementation be improved in your school in the future? The following section summarizes the findings for the 192 teachers, 37 teacher leaders, and 36 administrators who responded to the open-ended questions.

Results were analyzed thematically for the supports of coaching, CoreTools, and professional development, all of which were mentioned in the survey question prompt. In addition, we coded responses for collaboration and other more general issues that did not clearly fit within the other major themes (for example, responses that mentioned meetings but did not explicitly state whether they were for coaching, collaboration, or professional development). Finally, we coded responses that did not answer the question: for example, responses that said *not applicable* or *nothing*, people who only made negative comments when asked to say what was most useful, and individuals who only said something positive in regards to the question about what was least helpful. A summary of the coding can be found in Table 3.2.

Table 3.2

Major Themes From Open-Ended Survey Items About LDC Supports

	Teacher		Teacher leader		Administrator		Total	
Supports	#	%	#	%	#	%	#	%
Most useful								
Collaboration	33	17.2	2	5.4	2	5.6	37	14.0
Coaching	121	63.0	26	70.3	29	80.6	176	66.4
CoreTools	73	38.0	22	59.5	17	47.2	112	42.3
Professional development	29	15.1	10	27.0	6	16.7	45	17.0
Other	11	5.7	7	18.9	0	0.0	18	6.8
Least useful								
Collaboration	2	1.0	0	0.0	0	0.0	2	0.8
Coaching	47	24.5	4	10.8	3	8.3	54	20.4
CoreTools	42	21.9	12	32.4	7	19.4	61	23.0
Professional development	19	9.9	2	5.4	2	5.6	23	8.7
Other	19	9.9	2	5.4	3	8.3	24	9.1
Suggestions								
Collaboration	22	11.5	2	5.4	5	13.9	29	10.9
Coaching	25	13.0	5	13.5	7	19.4	37	14.0
CoreTools	30	15.6	6	16.2	2	5.6	38	14.3
Professional development	16	8.3	3	8.1	3	8.1	22	8.3
Other	112	58.3	24	64.9	20	55.6	156	58.9

Note. Each comment was coded for one or more themes; therefore, the total percentages could exceed 100%.

General Views

About one third of the responses to the open-ended questions did not directly respond to the question being asked. For example, 93 of the responses across the three questions had a neutral statement such as *not applicable* or *nothing*. In addition, 60 of the responses to the question about what was least helpful and nine of the responses to the question asking for suggestions simply provided a positive comment such as noting that the supports were *helpful*. Only seven responses across the three questions made a negative statement such as their not being interested in participating again. It should also be noted that eight of the respondents to the question about what support was most helpful put a general positive statement indicating that they found many or all of the supports listed to be helpful.

Collaboration

While not mentioned in the section prompt, a moderate number of respondents brought up collaboration as a form of support that they considered helpful (37 comments) or that they had suggestions about for the future (29 comments). Specific themes included the value of getting to engage with their colleagues to not only build community, but also to share materials, develop exemplars of student work, or plan or revise modules to name just a few. A number of respondents also highlighted the opportunity to work with or meet in grade level or department groupings. With regard to suggestions, the most salient theme involved desiring greater time to collaborate on the development, adaptation, or analysis of results for the modules. Furthermore, four respondents specifically mentioned wanting more PLC meeting time for collaboration, and seven respondents wanted more time to work in grade-level or department-level groups. Finally, in response to the question about what was not helpful, one teacher indicated that they wanted more department meetings to collaborate, and another noted that they never had a chance to collaborate at their school.

Coaching

Based on the open-ended responses, coaching was the most valued type of support provided for the implementation of LDC (176 comments). The majority of these comments focused on one or more of the modes in which the coaching was provided. More specifically, 33 respondents valued the in-person coaching, 78 valued the virtual coaching, and 22 valued coaching through both of these modes. In some cases, respondents provided extra detail, with 52 noting that they valued using Zoom for the virtual coaching, six mentioning the use of email, and one noting that they appreciated the coaching via CoreTools. A moderate number of respondents to this question also mentioned the person who provided the coaching for their school (68 comments). For example, respondents mentioned their LDC coordinator, LDC coach, teacher leader, district lead, and/or provided the name of an individual who provided coaching. Finally, 34 respondents pointed out that one of the benefits of the coaching was the opportunity to receive written or verbal feedback.

Participants also provided comments about what they felt did not work well or what they would like to have seen regarding the coaching. The most common theme regarding what did not work well involved the virtual coaching (42 comments). Individuals particularly felt that Zoom was problematic (29 comments) with some pointing out that they had technology issues and/or that it affected engagement across the group. While seven participants also mentioned the in-person coaching, these comments tended to focus on the lack of these opportunities, especially outside of the confines of the PLC meetings. The results for the question about suggestions align with these results. That is, 19 individuals commented that they would like more in-person coaching, seven indicated that they would like less virtual coaching, and only five said that they wanted more virtual opportunities. Finally, a few respondents made suggestions about content for the coaching, such as greater support in choosing modules to

adapt, modeling lessons, and providing feedback about how teachers can improve their modules.

CoreTools Online Platform

Based on their comments, teachers, teacher leaders, and administrators all felt that there were positive (112 comments) and less positive (61 comments) aspects to the CoreTools platform. While some of the respondents who liked CoreTools did not specify why it was a helpful support, those who did were most likely to highlight the module creator (16 comments), the LEARN tab that includes various professional development materials (19 comments), or the library (40 comments) that includes different mini-tasks and modules that can be integrated or adapted. For those respondents who felt that there were drawbacks to CoreTools, the most cited issues involved the library (11 comments), the ease of use of the platform (18 comments), and the LEARN tab (27 comments). Suggestions that respondents made focused on similar themes including the LEARN tab (four comments), the module creator (nine comments), library (10 comments), and/or ease of use (11 comments). Among the suggestions made in response to both questions were to make the navigation of CoreTools and the LEARN tab easier and more intuitive, improve the breadth of modules or mini-tasks in the library (e.g., grades, content areas, English learners, etc.), and improve the ability for teachers and/or administrators to collaboratively work in the module creator.

Professional Development

Respondents also pointed out more positives (45 comments) than negatives (23 comments) regarding the professional development they were offered as part of their implementation of LDC. More specifically, moderate numbers of respondents indicated that they found the in-person professional development (14 comments) and/or the professional development opportunities that took place on the weekend or during the summer (13 comments) the most helpful. In addition, while 11 respondents indicated that they found the LEARN tab course(s) to be a helpful form of professional development, 14 respondents did not like one or more aspects of the online courses and an additional two respondents did not do any online courses. Finally, small numbers of respondents noted that they found the professional development provided by their district (two comments) or the i3 grant director (two comments) to be helpful, and another respondent suggested that the district provide the initial in-person training.

Other General Views

As previously noted, some responses did not clearly align with the four main themes. While these were mostly found in response to the question asking for suggestions, some were found for the other two questions. The most common of these were focused on issues of time and/or meetings with four individuals making positive statements and 15 pointing out issues such as needing more time. Time was also a very common theme among the suggestions (79 comments) with most respondents wanting more time for meetings, planning, and/or

implementation of the modules. A moderate number of respondents also suggested that their school expand participation (44 comments) by including more teachers, grade levels, and/or subject areas. As one teacher stated, “Involve the lower grades so there is more continuity.” Finally, 14 respondents indicated that they would like to see more buy-in from administrators at the school and/or district level and another 14 noted that they would like to see more alignment in regards to competing initiatives, pacing plans, curricula, etc.

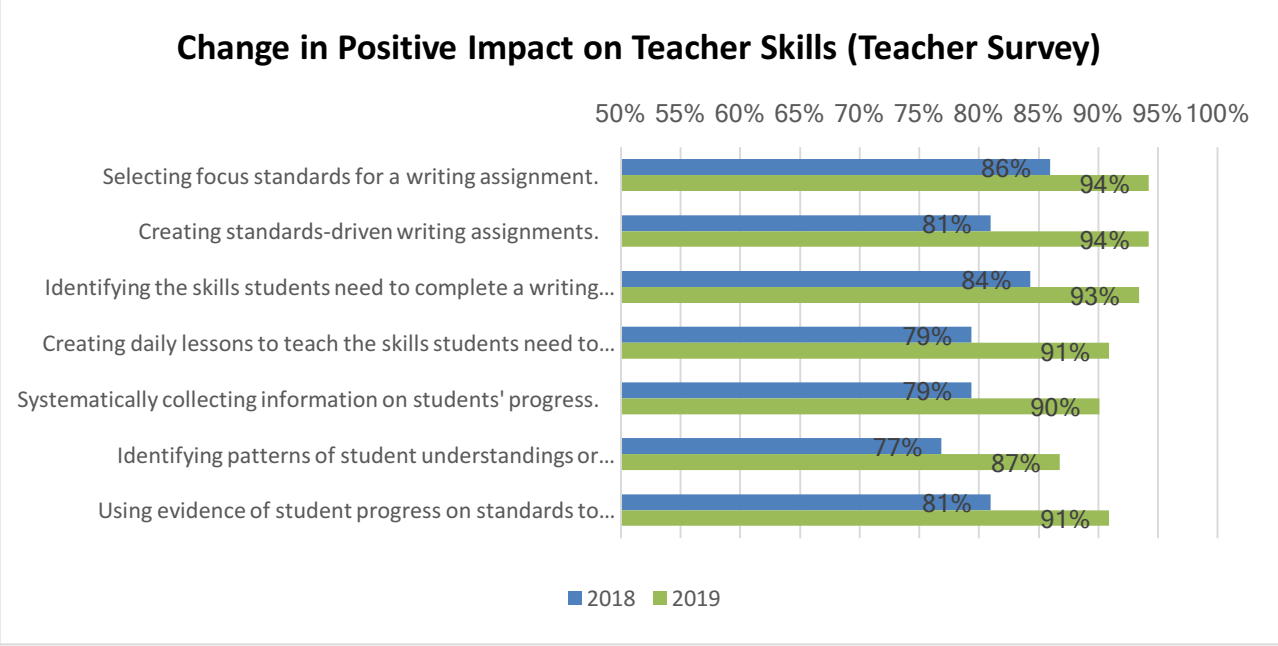
3.5 Exploratory Analysis

In order to examine change in the perceived impacts among returning teachers, survey ratings were compared for teachers who submitted a survey during both spring 2018 and spring 2019. The following presents the descriptive results for the 121 teachers who participated at both time points.

When examining the longitudinal results regarding the impact of LDC on their teaching skills, the percentage of teachers who provided a positive rating of *moderately* to *a great deal* increased across the 2 school years (see Figure 3.30). More specifically, percentages increased by 8% to 13% for each item. Furthermore, by spring 2019, the percentage of teachers providing positive ratings met or exceeded 90% on all but one item. In addition, as can be seen in Table 3.3, when looking at the direction of change in ratings across the 4-point scale *(not at all* to *a great deal)*, most teachers ratings showed no change (45.5% to 56.2%) or increased by one or more levels (29.8% to 37.2%).

Figure 3.30

Change in Teacher Perceptions of the Positive Impact of LDC on Teacher Skills



Note. n = 121.

Table 3.3

Change in Teacher Perceptions of the Impact of LDC on Teacher Skills (n = 121)

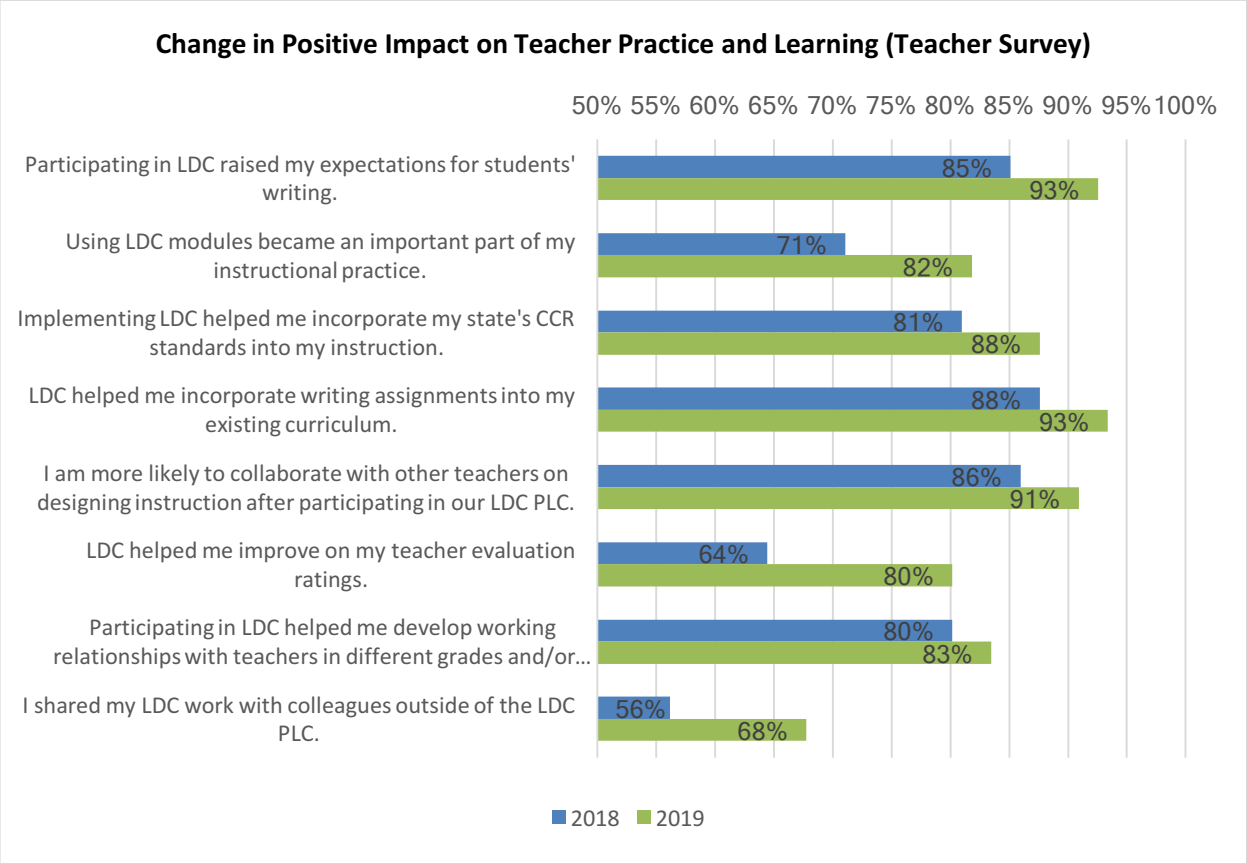
Dimension	Negative		No change		Positive	
	#	%	#	%	#	%
Selecting focus standards for a writing assignment.	17	14.0	68	56.2	36	29.8
Creating standards-driven writing assignments.	14	11.6	62	51.2	45	37.2
Identifying the skills students need to complete a writing assignment.	19	15.7	65	53.7	37	30.6
Creating daily lessons to teach the skills students need to complete a writing assignment.	19	15.7	55	45.5	47	38.8
Systematically collecting information on students' progress.	20	16.5	57	47.1	44	36.4
Identifying patterns of student understandings or misconceptions.	21	17.4	56	46.3	44	36.4
Using evidence of student progress on standards to modify subsequent instruction.	20	16.5	62	51.2	39	32.2

Note. Four-point agreement scale ranging from *not at all* to *a great deal*.

Positive growth was also found when examining change in teachers' perceptions about the impact of LDC on various facets of their teaching practice, including collaboration and standards alignment (see Figure 3.31). First, percentages of teachers who gave a positive rating (i.e., *agree* or *strongly agree*) increased for each of these items. In this case, though, there was more variation in the positive change (3% to 16%). Furthermore, the largest amount of growth was found for improving on their teacher evaluation ratings as well as sharing work with colleagues outside of the PLC. Positive change in the perceived impact of LDC on teacher evaluation ratings and the propensity of teachers to share work with colleagues was particularly marked. As shown in Table 3.4, most teachers' ratings were stable (44.6% to 60.3%) or increased by one or more levels on the agreement scale (26.4% to 39.7%).

Figure 3.31

Change in Teacher Perceptions of the Positive Impact of LDC on Their Teaching Practice and Learning



Note. n = 121.

Table 3.4

Change in Teacher Perceptions of the Impact of LDC on Teacher Practice and Learning, Counts and Percentages (n = 121)

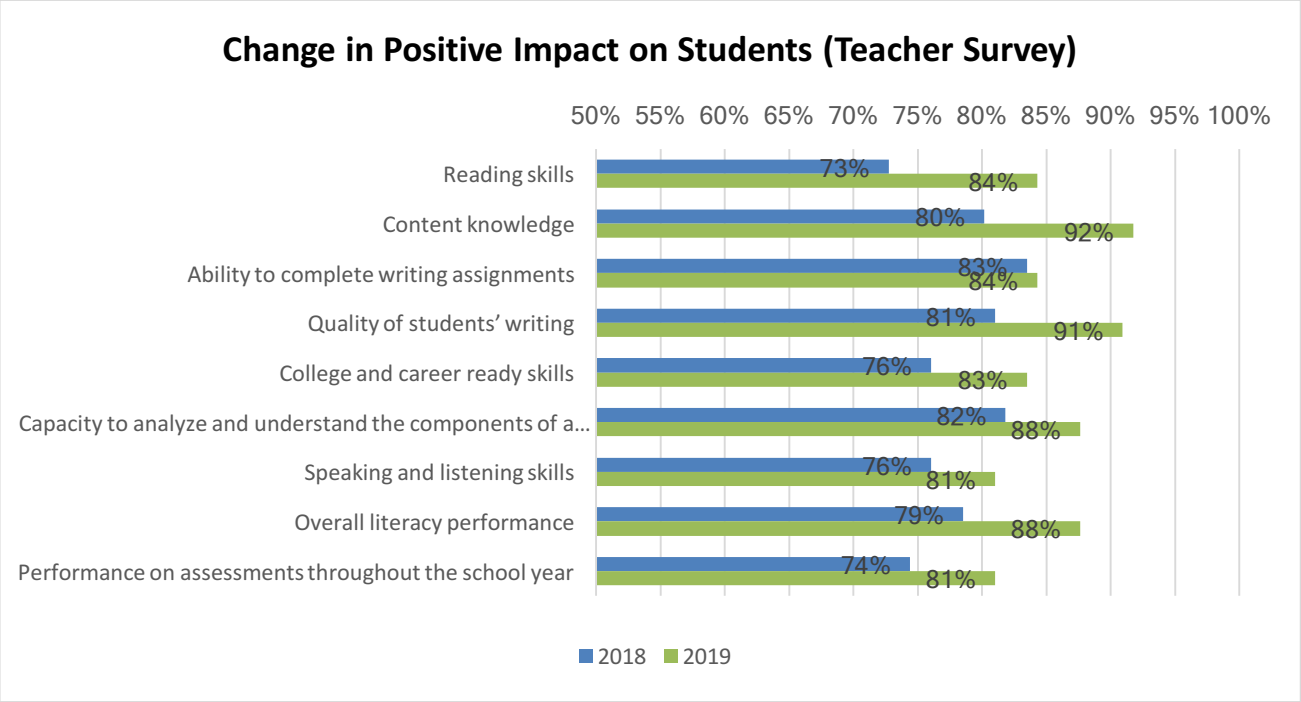
Dimension	Negative		No change		Positive	
	#	%	#	%	#	%
Participating in LDC raised my expectations for students' writing.	15	12.4	70	57.9	36	29.8
Using LDC modules became an important part of my instructional practice.	15	12.4	65	53.7	41	33.9
Implementing LDC helped me incorporate my state's CCR standards into my instruction.	16	13.2	73	60.3	32	26.4
LDC helped me incorporate writing assignments into my existing curriculum.	20	16.5	65	53.7	36	29.8
I am more likely to collaborate with other teachers on designing instruction after participating in our LDC PLC.	24	19.8	63	52.1	34	28.1
LDC helped me improve on my teacher evaluation ratings.	17	14.0	56	46.3	48	39.7
Participating in LDC helped me develop working relationships with teachers in different grades and/or subjects.	19	15.7	68	56.2	34	28.1
I shared my LDC work with colleagues outside of the LDC PLC.	21	17.4	54	44.6	46	38.0

Note. Four-point agreement scale ranging from *strongly disagree* to *strongly agree*.

Finally, we examined changes in teacher ratings concerning the impact of LDC on nine different student outcomes. As can be seen in Figure 3.32, there were small to moderate increases (1% to 12%) in the percentage of teachers who gave positive ratings *(moderately* to *a great deal)* for each of the items. The largest growth in positive ratings was found for student improvement in content knowledge, reading skills, and the quality of students' writing. Despite this last point, there was only a 1% increase in positive ratings concerning students' ability to complete writing assignments. Finally, results concerning general changes in ratings mirrored those found for the other two longitudinal analyses (see Table 3.5). More specifically, the largest proportion of teachers showed no change in their ratings for the items between the two survey administrations (46.3% to 61.2%), with the next largest proportion showing an increase of one or more levels on the agreement scale per item (21.5% to 38.0%).

Figure 3.32

Change in Teacher Perceptions of the Positive Impact of LDC on Students



Note. n = 121.

Table 3.5

Change in Teacher Perceptions of the Impact of LDC on Students, Counts and Percentages (n = 121)

Dimension	Negative		No change		Positive	
	#	%	#	%	#	%
Reading skills	20	16.5	61	50.4	40	33.1
Content knowledge	20	16.5	62	51.2	39	32.2
Ability to complete writing assignments	21	17.4	74	61.2	26	21.5
Quality of students' writing	21	17.4	59	48.8	41	33.9
College and career ready skills	23	19.0	60	49.6	38	31.4
Capacity to analyze and understand the components of a writing assignment	21	17.4	63	52.1	37	30.6
Speaking and listening skills	20	16.5	56	46.3	45	37.2
Overall literacy performance	17	14.0	64	52.9	40	33.1
Performance on assessments throughout the school year	16	13.2	59	48.8	46	38.0

Note. Four-point agreement scale ranging from *not at all* to *a great deal*.

3.6 Summary of Results

This survey captured the responses of 87% of all participants in the district's third year of implementation. Based on the survey analyses, a majority of teachers and teacher leaders implemented LDC as expected. Most reported implementing multiple modules across the school year. The majority of participants also reported that they developed or adapted their module(s) collaboratively and that they primarily adapted existing modules. About two thirds of participants also noted on their surveys that they found the CoreTools platform and/or professional development to be helpful. Despite this, some did report that the CoreTools site in general and the LEARN tab specifically could be difficult to navigate, and that the videos were not always helpful. In addition, while the teachers who made use of the National Peer Review process found it helpful, most teachers reported that they did not make use of this LDC feature.

Participants tended to feel supported in their implementation of LDC. At the local level, teachers had very positive opinions of their teacher leaders, found the opportunity to collaborate with their peers to be helpful, and frequently reported that their administrator(s) provided encouragement and resources. Teachers and teacher leaders also tended to report positive opinions of the LDC coaches, and many noted that the coaching was one of their most valued supports. In addition, while teacher leaders and administrators felt that the district supported implementation of LDC, moderate percentages felt that district leadership did not have a firm understanding of the program, was not interested in spreading its use, or did not align other district professional development with the initiative. Some participants also expressed concerns about whether participants in their PLC were committed to sustaining LDC, such as recruiting more teachers to participate during the next school year.

Participants perceived multiple positive impacts of the LDC initiative that aligned with the initiative. For example, most teachers, teacher leaders, and administrators felt that the program helped students to develop their writing and literacy skills. Teachers and administrators felt that teachers improved their ability to select focus writing standards and identify the skills that students need to develop to complete writing assignments. In addition, most teachers reported improvement in their expectations for their students' writing, their ability to incorporate writing assignments into the existing curriculum, and their likeliness to collaborate on the design of instruction. Finally, the areas with the least perceived impact aligned less directly with LDC, and included issues such as the development of college and career ready skills, speaking and listening skills, and/or performance on assessments.

Finally, an exploratory analysis was conducted to examine change in teachers' perceptions of the impacts of LDC for the 121 teachers who submitted a survey in both spring 2018 and spring 2019. As with the primary analyses for the three scales we examined (teacher skills, teacher practice and learning, student skills) we found positive results. More specifically, the percentage of teachers who provided positive ratings increased for every item. In addition, when examining general change in ratings across all levels of the agreement scales, we found

that most teachers provided the same or a higher rating. In other words, teachers tended to maintain or improve in their positive perceptions about the impact of LDC on their own practice, as well as on their students' skills.

4.0 Analyses of LDC CoreTools Data

In the following section, we report on how participants interacted with LDC's CoreTools online system. We begin by presenting participation rates for key CoreTools activities, including creating a user account, and viewing, editing, and commenting on modules. We then dig deeper into the three CoreTools activities, by providing descriptive statistics for all i3 CoreTools users followed by results broken down by key subgroups (including LDC role, school level, cohort, and content area taught). After that, we compare the level of engagement for i3 CoreTools users who completed and taught a full-length module to those users who did not complete and teach a module during the school year. Finally, we summarize results.

4.1 CoreTools Activity Participation Rates

The four key CoreTools activities we examined are creating a user account, viewing modules, editing modules, and commenting on modules. With the exception of two administrators, all participants created CoreTools user accounts. Among the 310 CoreTools users, 264 were classroom teachers (with 32 of those individuals acting as teacher leaders), five were coaches or coordinators playing the teacher leader role, and 41 of them were administrators.

As seen in Table 4.1, most participants used CoreTools to at least some degree. Ninety-nine percent of all participants created a user account, 88% of participants viewed modules, and 70% edited modules. Commenting on modules was a less common activity with only 34% of all participants doing so. Teachers and teacher leaders also had higher participation rates than the principals and assistant principals, as expected.

Table 4.1

CoreTools Feature Participation Rates: 2017–2018 (Counts and Percentages)

Participant type	*n*	User account	Viewed a module	Edited a module	Commented on a module
Teacher	232	232 (100%)	219 (94%)	184 (79%)	81 (35%)
Teacher leader (classroom teacher)	32	32 (100%)	32 (100%)	29 (91%)	20 (63%)
Total teachers	**264**	**264 (100%)**	**252 (95%)**	**213 (81%)**	**101 (38%)**
Teacher leader (coach/coordinator)	5	5 (100%)	4 (80%)	3 (60%)	3 (60%)
Administrator (principals and assistant principals)	43	41 (95%)	20 (47%)	1 (2%)	2 (5%)
Total participants	**312**	**310 (99%)**	**275 (88%)**	**217 (70%)**	**106 (34%)**

As previously noted, nearly all participants created a CoreTools user account. Significantly, even administrators, who generally were not a part of the regular PLC meetings, overwhelmingly created user accounts. This suggests that the vast majority of administrators overseeing LDC PLCs had at least some familiarity with the online platform. Likewise, nearly all PLC teachers and teacher leaders viewed modules in CoreTools. A little less than half of principals and assistant principals viewed modules in the platform.

We consider editing modules to be the key indicator of deep engagement with the CoreTools module building platform. Eighty-one percent of participating teachers edited at least one module. In contrast, only one administrator engaged at the level of editing modules.

Overall, adding comments to modules was a much less common activity. Less than 40% of classroom teachers and only five coaches, coordinators, or administrators commented. Commenting was, not surprisingly, most common among teacher leaders, whose role was most conducive to giving feedback to PLC members.

4.2 Engagement With Key CoreTools Activities

In this section, we describe participants' level of engagement with three key CoreTools activities: viewing modules, editing modules, and commenting on modules. Descriptive statistics are reported for all participants, as well as a number of subgroups. These subgroups capture the role the individual played in LDC (teacher, teacher leader, and administrator), the level of the school at which the participant worked (elementary, K–8, middle, 6–12, or high), the cohort group describing when the school and individual participant began taking part in LDC, and in the case of teachers, the content area taught (elementary/multiple subjects, secondary ELA, secondary history/social studies, and secondary science). As noted earlier, some participants played multiple roles in the intervention, so the teacher and teacher leader groups overlap to some degree as they do in our survey analysis. Descriptive statistics are only reported for groups with five or more members. The samples for the viewing, editing, and commenting analyses are the 310 LDC participants with CoreTools user accounts in 2018−2019 (see Table 4.1).

Module Viewing

In Table 4.2 we present descriptive statistics on how many times i3 participants viewed modules, both overall and by subgroup. We present the minimum and maximum number of views, means and standard deviations, and the sum of total views across participants. Overall, the average participant viewed modules about 37 times, although the range varied greatly from zero to 515 views. There were 35 participants with user accounts who did not view any modules (about 11% of the overall sample).

Differences in module viewing by participant role were dramatic. Teacher leaders viewed over twice the number of modules as teachers on average (95.5 compared to 51.0). Administrators also viewed modules much less frequently (3.2). Participants in Cohort 2 schools

on average viewed more modules than participants in Cohort 1 schools. Participants newly joining LDC in 2018–2019 at schools in both cohorts viewed fewer modules than their peers who had participated in prior years as well. Participants in K–8 and 6–12 schools viewed more modules than their peers in elementary, middle, or high school. Finally, secondary ELA and social studies/history teachers viewed more modules on average than secondary science teachers and elementary teachers.

Table 4.2

Descriptive Statistics for the Number of Times a Participant Viewed a Module in CoreTools, by Participant Subgroup

Subgroup	*n*	Min	Max	*M*	*SD*	Sum
All participants	310	0	515	36.7	52.2	11,387
Participant role						
All teachers	264	0	515	41.0	52.1	10,827
All teacher leaders	37	0	515	95.5	107.9	3,534
All administrators	41	0	35	3.2	6.8	133
Cohort						
Cohort 1 / teacher started 2016−2017	42	0	287	23.4	49.4	982
Cohort 1 / teacher started 2017−2018	16	0	177	34.8	41.3	556
Cohort 1 / teacher started 2018−2019	21	0	110	17.2	24.3	361
Cohort 2 / teacher started 2017−2018	149	0	515	44.2	64.1	6,584
Cohort 2 / teacher started 2018−2019	82	0	132	35.4	30.0	2,904
School level						
Elementary school participants	202	0	515	35.3	51.1	7,129
K–8 participants	21	0	291	61.2	80.2	1,285
Middle school participants	57	0	238	26.6	37.5	1,518
6–12 participants	21	5	269	54.3	55.6	1,141
High school participants	9	0	177	34.9	54.4	314
Content area taught						
Elementary/multiple subjects	177	0	515	40.1	52.4	7,093
Secondary ELA	36	0	238	50.7	60.1	1,825
Secondary social studies/history	25	0	269	52.8	67.8	1,321
Secondary science	17	0	95	29.8	28.4	506

Module Editing

As shown in Table 4.3, on average participants made about 12 edits over the course of the school year. There was a wide range of engagement from editing zero times to making 227 edits to modules. Ninety-three participants with CoreTools user accounts (30%) did not do any editing of modules.

Table 4.3

Descriptive Statistics for the Number of Times a Participant Edited a Module in CoreTools, by Participant Subgroup

Subgroup	*n*	Min	Max	*M*	*SD*	Sum
All participants	310	0	227	12.1	22.0	3,760
Participant role						
All teachers	264	0	227	13.7	22.7	3,623
All teacher leaders	37	0	227	36.5	46.1	1,352
All administrators	41	0	1	0.0	0.2	1
Cohort						
Cohort 1 / teacher started 2016–2017	42	0	91	8.5	16.6	355
Cohort 1 / teacher started 2017–2018	16	0	57	11.8	16.6	189
Cohort 1 / teacher started 2018–2019	21	0	15	4.4	5.2	93
Cohort 2 / teacher started 2017–2018	149	0	227	15.6	27.9	2,329
Cohort 2 / teacher started 2018–2019	82	0	63	9.7	13.5	145
School level						
Elementary school participants	202	0	120	10.3	17.5	2,084
K–8 participants	21	0	291	27.8	51.2	583
Middle school participants	57	0	63	8.6	14.4	491
6–12 participants	21	0	117	23.9	25.5	501
High school participants	9	0	48	11.2	14.8	101
Content area taught						
Elementary/multiple subjects	177	0	120	11.7	18.0	2,062
Secondary ELA	36	0	227	20.9	39.1	751
Secondary social studies/history	25	0	227	26.2	48.4	656
Secondary science	17	0	58	11.7	16.2	198

Subgroup results for the module editing mirrored those found for page viewing. There was a dramatic difference between teacher leaders and teachers, with teacher leaders editing more than twice the number of modules on average. Administrators simply did not engage at this level in 2018–2019, with just one administrator making a single edit. While Cohort 2 participants edited more modules on average, participants joining LDC in 2018–2019 edited fewer modules. Teachers in K–8 and 6–12 schools as well as those teaching secondary ELA and social studies/history edited modules at greater levels than their peers.

Module Commenting

Only 106 participants, representing about one third of all participants, made at least one comment on a module. As shown in Table 4.4, while participants commented between zero and 42 times, the average was just over two times. Across participant roles, teacher leaders had the highest level of engagement, with nine comments on average.

Table 4.4

Descriptive Statistics for the Number of Times a Participant Commented on a Module in CoreTools, by Participant Subgroup

Subgroup	*n*	Min	Max	*M*	*SD*	Sum
All participants	310	0	42	2.2	6.2	691
Participant role						
All teachers	264	0	42	2.5	6.5	647
All teacher leaders	37	0	42	8.6	12.6	317
All administrators	41	0	6	0.2	0.9	7
Cohort						
Cohort 1 / teacher started 2016–2017	42	0	38	2.5	6.2	103
Cohort 1 / teacher started 2017–2018	16	0	21	3.1	5.9	49
Cohort 1 / teacher started 2018–2019	21	0	7	0.7	1.6	15
Cohort 2 / teacher started 2017–2018	149	0	42	2.5	7.0	379
Cohort 2 / teacher started 2018–2019	82	0	38	1.8	5.5	145
School level						
Elementary school participants	202	0	38	2.1	6.1	429
K–8 participants	21	0	35	4.3	9.1	90
Middle school participants	57	0	42	2.3	6.2	130
6–12 participants	21	0	3	0.3	0.7	6
High school participants	9	0	21	4.0	7.1	36
Content area taught						
Elementary/multiple subjects	177	0	38	2.4	6.4	426
Secondary ELA	36	0	42	4.1	9.6	149
Secondary social studies/history	25	0	35	3.2	7.4	81
Secondary science	17	0	8	1.3	2.1	22

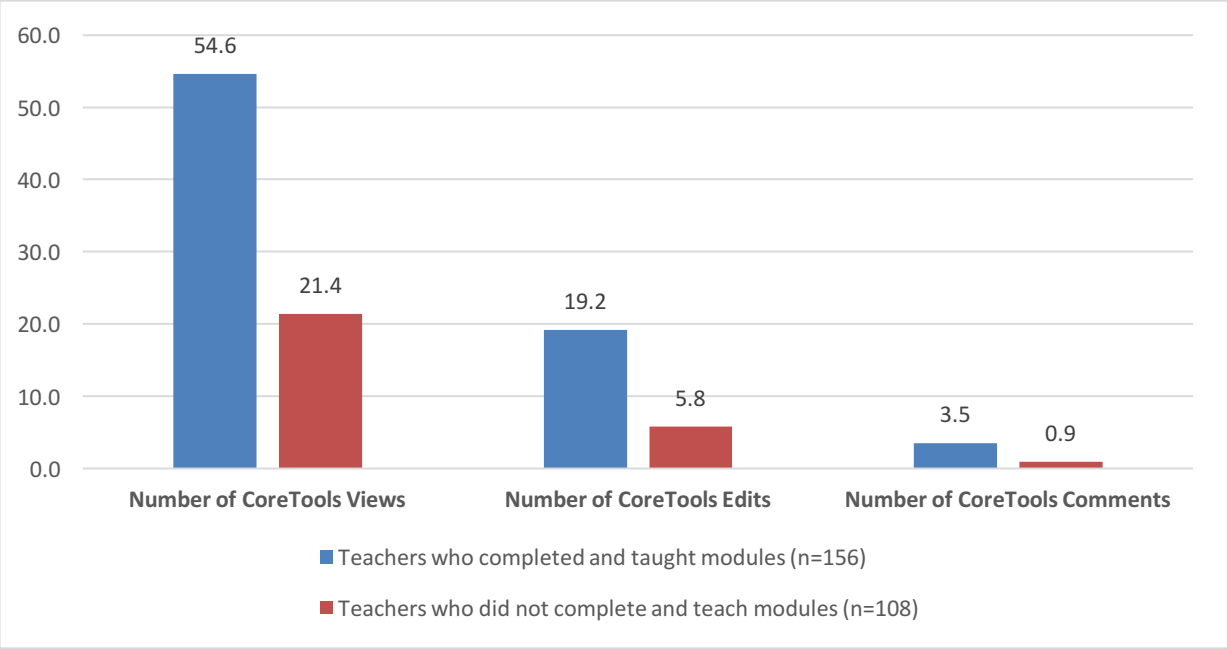
4.3 CoreTools Engagement as an Implementation Variable

To evaluate the validity of CoreTools engagement as an indicator of LDC implementation, we examined the relationship between the three CoreTools engagement measures and module implementation. As described in the next chapter, CRESST identified full-length modules that i3 teachers created and/or adapted and taught in their classrooms. While all teachers may have taught the module(s) in their classrooms, we took the presence of uploaded student work as

evidence of teachers having done so. Figure 4.1 displays the mean number of CoreTools views, edits, and comments for the 156 participants who completed and taught at least one full-length LDC module and their 108 peers for whom we do not have evidence of full module implementation. As shown, teachers who completed and taught full-length LDC modules exhibited considerably more engagement with CoreTools than their peers, across all three metrics. The results suggest that participants who engage deeply with the module building platform are more likely to complete and teach LDC modules.

Figure 4.1

Mean Number of Coretools Views, Edits, and Comments Made by Teachers Who Did and Did Not Complete and Teach Modules



4.4 Summary of Results

While descriptive analyses of CoreTools user behavior showed evidence of broad engagement with LDC's module building platform, the depth of that engagement varied greatly across users. Nearly all 2018–2019 LDC participants, including principals, created a CoreTools user account, and the vast majority of teachers in PLCs viewed and edited modules. The average teacher, however, only made 14 edits to modules within CoreTools. While this might be interpreted as evidence that teachers' engagement in instructional design was somewhat limited, the CoreTools data do not provide any measures of instructional design work conducted offline by individuals or groups of teachers. In addition, our examination of editing at the individual level is unable to capture teachers working together on a module in one user account.

Furthermore, this descriptive analysis provides a broad rather than deep look, and does not take into account LDC expectations that teachers will do very little design work on their first module and extensive instructional design on their later modules. Teacher leaders on average engaged at higher levels than their peers not playing a leadership role in the LDC intervention. Cohort 2 teachers engaged at higher levels than their peers, while teachers newly entering the LDC program 2018–2019 engaged at lower levels than their peers. Participants teaching secondary ELA and history/social studies also engaged at higher levels than their peers in secondary science and at the elementary level.

5.0 Module Artifact Analysis

This section presents results for the analysis of modules submitted during the 2018–2019 school year. We first present overall results across the grade bands. This is followed by separate results for the elementary and secondary modules. Finally, we present results of an exploratory analysis examining results across time for teachers who submitted modules across the last 2 school years, the qualitative results, and a summary of the findings. Tables F1 through F4 in Appendix F contain the generalization theory results.

Table 5.1 shows the overall means and standard deviations by grade band for the module artifact analysis. When examining the ratings, the secondary modules received higher mean ratings than did the elementary modules. More specifically, mean ratings for the secondary modules ranged from 3.45 to 3.82, indicating that on average all dimensions were moderately present or realized. In contrast, mean ratings for the elementary modules were in the low to mid threes (3.00 to 3.44). The highest means for each grade band were for Dimension 1, which measures the effectiveness of the writing task, and Dimension 2, which measures standards alignment.

Table 5.1

Means and Standard Deviations for the Modules

Dimension	Elementary (n = 104)	Secondary (n = 51)	Overall (n = 155)
1. Effective writing task	3.44 (1.00)	3.82 (0.93)	3.57 (0.99)
2. Standards alignment	3.27 (1.16)	3.80 (0.87)	3.45 (1.10)
3. Fidelity to LDC instruction	3.00 (1.18)	3.45 (1.08)	3.15 (1.17)
4. Quality instructional strategies	3.18 (1.17)	3.69 (1.07)	3.35 (1.16)
5. Coherence/clarity of module	3.21 (1.14)	3.61 (1.00)	3.34 (1.11)
6. Overall impression	3.15 (1.07)	3.59 (0.88)	3.30 (1.03)
Average (Dimensions 1 to 5)	3.22 (0.92)	3.68 (0.67)	3.37 (0.87)

Furthermore, as one would hope to find, the average summary scores for the first five dimensions were similar to the overall impression ratings (Dimension 6) provided by the expert teachers. Finally, when examining the frequencies, elementary modules tended to have a lower proportion of modules with ratings of 4 or greater out of a possible 5 on the dimensions (36% to 48% depending on the dimension) than did the secondary modules (53% to 65%). Greater detail about the frequencies can be found in Table F5 in Appendix F.

5.1 Analysis of Elementary Modules

The following section presents descriptive results for the elementary modules disaggregated by content area and then by cohort. Results from the generalizability theory modules as well as the expanded descriptive results for the elementary modules can be found in Appendix F.

Descriptive Results by Content Area

Table 5.2 presents descriptive results for the elementary modules by content area. A few comparative observations can be made. First, the social studies modules received the lowest mean ratings on all dimensions (2.48 to 3.00). Second, mean ratings for Dimensions 1 and 2 were highest for the science modules, and the ratings for Dimensions 3 to 6 were highest for the ELA modules. Third, for the ELA and science modules, the average summary scores for the first five dimensions were similar to the overall impression ratings (Dimension 6) provided by the expert raters. In contrast, for the social studies modules, the average summary score was 0.19 higher than the mean for Dimension 6. Finally, the social studies modules had the lowest proportion of ratings of 4 or greater out of a possible 5 on each dimension when compared to the other content results (see Table F6 in Appendix F).

Table 5.2

Means and Standard Deviations for the Elementary Modules by Content Area

Dimension	ELA (n = 38)	Science (n = 43)	Social studies (n = 23)
1. Effective writing task	3.42 (0.79)	3.70 (0.94)	3.00 (1.28)
2. Standards alignment	3.26 (0.79)	3.56 (1.26)	2.74 (1.32)
3. Fidelity to LDC instruction	3.34 (0.99)	3.00 (1.25)	2.44 (1.16)
4. Quality instructional strategies	3.50 (0.95)	3.23 (1.19)	2.56 (1.27)
5. Coherence/clarity of module	3.58 (0.98)	3.21 (1.17)	2.61 (1.12)
6. Overall impression	3.37 (0.91)	3.33 (0.92)	2.48 (1.31)
Average (Dimensions 1 to 5)	3.42 (0.78)	3.34 (0.84)	2.67 (1.09)

Descriptive Results by Cohort

Table 5.3 presents descriptive results for the elementary modules by cohort, and there are three Cohort 1 groups (teachers starting in 2016−2017, 2017−2018, or 2018−2019) and two Cohort 2 groups (teachers starting in 2017−2018 or 2018−2019). Because of the large differences in sample sizes, we focus our discussion on the cohort groups with five or greater modules.

First, as can be seen, means were generally in the threes for each dimension. The exceptions included the pooled Cohort 1 results for Dimensions 3 to 5 (2.74 to 2.91) and the Cohort 1 2016–2017 results for Dimension 3 (2.88). Second, means were generally highest for the first two dimensions, which focused on the effective writing task and standards alignment, and were generally lowest for Dimension 3, which rated fidelity to LDC instruction. Third, in comparing the Dimension 6 ratings to the average for the first five dimensions, it is apparent that expert teachers' overall impressions were fairly aligned for each of the cohort subgroups. Finally, with the exception of Dimension 4, which measures quality instructional strategies, Cohort 2 2017–2018 had the lowest proportion of ratings of 4 or greater out of a possible 5 on each dimension when compared to the other cohort groupings (see Table F7 in Appendix F).

Table 5.3

Means and Standard Deviations for the Elementary Modules by i3 Cohort Grouping

Dimensions	2016–2017	2017–2018	2018–2019	Total
Cohort 1	*n* = 16	*n* = 3	*n* = 4	*n* = 23
1. Effective writing task	3.50 (1.15)	--	--	3.35 (1.07)
2. Standards alignment	3.62 (1.20)	--	--	3.30 (1.18)
3. Fidelity to LDC instruction	2.88 (1.31)	--	--	2.74 (1.18)
4. Quality instructional strategies	3.06 (1.29)	--	--	2.87 (1.18)
5. Coherence/clarity of module	3.06 (1.34)	--	--	2.91 (1.20)
6. Overall impression	3.31 (1.08)	--	--	3.00 (1.21)
Average (Dimensions 1 to 5)	3.22 (1.03)	--	--	3.04 (0.95)
Cohort 2	NA	*n* = 51	*n* = 30	*n* = 81
1. Effective writing task	NA	3.45 (0.94)	3.50 (1.07)	3.47 (0.99)
2. Standards alignment	NA	3.12 (1.14)	3.50 (1.17)	3.26 (1.16)
3. Fidelity to LDC instruction	NA	3.10 (1.14)	3.03 (1.27)	3.07 (1.18)
4. Quality instructional strategies	NA	3.26 (1.13)	3.30 (1.24)	3.27 (1.16)
5. Coherence/clarity of module	NA	3.22 (1.06)	3.43 (1.19)	3.30 (1.11)
6. Overall impression	NA	3.14 (0.94)	3.30 (1.18)	3.20 (1.03)
Average (Dimensions 1 to 5)	NA	3.23 (0.85)	3.35 (1.02)	3.27 (0.91)

Note. Means not presented for samples of less than five.

5.2 Analysis of Secondary Modules

The following section presents descriptive results for the secondary modules disaggregated by content area and then by cohort. Results from the generalizability theory

modules as well as the expanded descriptive results for the secondary modules can be found in Appendix F.

Descriptive Results by Content Area

Table 5.4 presents descriptive results for the secondary modules by content area. Because of the small sample size for science, we only present our observations for the ELA and social studies modules. First, the modules for the two content areas tended to have different strengths. For example, the ELA modules had moderately higher means than did the social studies modules for Dimensions 1 and 2, which focus on the foundational skills of the effective writing task and standards alignment. In contrast, the social studies modules had moderately higher means than did the ELA modules regarding Dimensions 5 and 6, which measure coherence and clarity of the module and expert rater overall impression. Second, both ELA and social studies modules had the lowest means for Dimension 3, which rates fidelity to LDC instruction (3.44, 3.50). Third, the average summary scores for the social studies modules were similar to the overall impression (Dimension 6) ratings provided by the expert teachers. In contrast, the Dimension 6 ratings were somewhat low for ELA, indicating that expert raters were somewhat more conservative in comparison to the summary score. Finally, when looking at the proportion of ratings of 4 or greater out of a possible 5, percentages ranged from 50% to 72% for ELA and from 44% to 81% for each of the social studies dimensions (see Table F8 in Appendix F).

Table 5.4

Means and Standard Deviations for Secondary Modules by Content Area

Dimension	ELA (*n* = 32)	Science (*n* = 3)	Social studies (*n* = 16)
1. Effective writing task	3.97 (0.97)	—	3.50 (0.82)
2. Standards alignment	3.84 (0.95)	—	3.56 (0.63)
3. Fidelity to LDC instruction	3.44 (1.19)	—	3.50 (0.97)
4. Quality instructional strategies	3.72 (1.17)	—	3.75 (0.86)
5. Coherence/clarity of module	3.56 (1.16)	—	3.88 (0.50)
6. Overall impression	3.53 (1.02)	—	3.75 (0.58)
Average (Dimensions 1 to 5)	3.71 (0.77)	—	3.64 (0.51)

Note. Means not presented for samples of less than five.

Results by Cohort

Table 5.5 presents descriptive results for the secondary modules for the three i3 Cohort 1 groupings (2016−2017, 2017−2018, 2018−2019) and two i3 Cohort 2 groupings (2017−2018, 2018−2019). Because of the large differences in sample sizes, we focus our discussion on the

cohort groupings with five or greater modules. First, all of the Cohort 2 results were in the mid- to high threes. This was true for each subgroup as well as the pooled Cohort 2 results. In contrast, the Cohort 1 results had some means below 3 or greater than 4. For example, the pooled Cohort 1 results for standards alignment (Dimension 2) was 4.08. Second, the summary scores calculated across Dimensions 1 to 5 were somewhat higher than the Dimension 6 means, indicating that expert raters were more conservative in their impressions of overall quality. Finally, when looking at the proportion of ratings of 4 or greater out of a possible 5, percentages were generally 50% or greater on each of the dimensions for each cohort grouping (see Table F9 in Appendix F).

Table 5.5

Means and Standard Deviations for the Secondary Modules by i3 Cohort Grouping

Dimension	2016–2017	2017–2018	2018–2019	Total
Cohort 1	*n* = 4	*n* = 6	*n* = 2	*n* = 12
1. Effective writing task	—	3.33 (1.03)	—	3.92 (1.00)
2. Standards alignment	—	4.17 (0.75)	—	4.08 (0.90)
3. Fidelity to LDC instruction	—	2.83 (0.75)	—	3.25 (1.14)
4. Quality instructional strategies	—	4.00 (0.63)	—	3.75 (1.14)
5. Coherence/clarity of module	—	4.00 (0.63)	—	3.67 (1.15)
6. Overall impression	—	3.50 (0.55)	—	3.58 (1.08)
Average (Dimensions 1 to 5)	—	3.67 (0.53)	—	3.73 (0.82)
Cohort 2	NA	*n* = 26	*n* = 13	*n* = 39
1. Effective writing task	NA	3.96 (0.92)	3.46 (0.88)	3.80 (0.92)
2. Standards alignment	NA	3.69 (0.93)	3.77 (0.72)	3.72 (0.86)
3. Fidelity to LDC instruction	NA	3.42 (1.03)	3.69 (1.18)	3.51 (1.07)
4. Quality instructional strategies	NA	3.65 (1.06)	3.69 (1.11)	3.67 (1.06)
5. Coherence/clarity of module	NA	3.58 (1.03)	3.62 (0.87)	3.59 (0.96)
6. Overall impression	NA	3.58 (0.81)	3.62 (0.87)	3.59 (0.82)
Average (Dimensions 1 to 5)	NA	3.66 (0.63)	3.65 (0.67)	3.66 (0.63)

Note. Means not presented for samples of less than five.

5.3 Exploratory Analysis of Modules

As previously noted, in order to examine potential growth among returning teachers, ratings were compared for teachers who were the first author and submitted complete modules in both the 2017–2018 and 2018–2019 school years. The following presents

descriptive results for the last complete module submitted by these teachers. Tables 5.6 and 5.7 present results for the 40 elementary teachers and 27 secondary teachers who submitted complete modules during both school years.

Table 5.6

Means and Standard Deviations for the Exploratory Analysis of Modules

Dimension	2017–2018	2018–2019	Change
Elementary (*n* = 40)			
1. Effective writing task	4.25 (0.78)	3.37 (0.90)	-0.88 (1.07)
2. Standards alignment	3.95 (0.85)	3.18 (1.24)	-0.78 (1.51)
3. Fidelity to LDC instruction	3.95 (1.28)	3.15 (1.23)	-0.80 (1.11)
4. Quality instructional strategies	3.85 (1.31)	3.40 (1.10)	-0.45 (1.48)
5. Coherence/clarity of module	3.85 (1.14)	3.45 (1.04)	-0.40 (1.03)
6. Overall impression	3.83 (1.20)	3.38 (0.90)	-0.45 (1.20)
Average (Dimensions 1 to 5)	3.97 (0.93)	3.31 (0.88)	-0.66 (0.94)
Secondary (*n* = 27)			
1. Effective writing task	3.59 (1.22)	4.04 (0.94)	0.44 (1.45)
2. Standards alignment	3.48 (0.89)	3.89 (0.93)	0.41 (1.37)
3. Fidelity to LDC instruction	3.70 (1.07)	3.30 (0.95)	-0.41 (1.37)
4. Quality instructional strategies	3.85 (1.06)	3.78 (1.09)	-0.07 (1.24)
5. Coherence/clarity of module	3.81 (1.14)	3.78 (0.89)	- 0.04 (1.12)
6. Overall impression	3.81 (0.79)	3.70 (0.78)	-0.11 (1.09)
Average (Dimensions 1 to 5)	3.69 (0.73)	3.76 (0.66)	0.07 (0.88)
Overall (*n* = 67)			
1. Effective writing task	3.99 (1.02)	3.64 (0.96)	-0.34 (1.39)
2. Standards alignment	3.76 (0.89)	3.46 (1.17)	-0.30 (1.56)
3. Fidelity to LDC instruction	3.85 (1.20)	3.21 (1.12)	-0.64 (1.23)
4. Quality instructional strategies	3.85 (1.21)	3.55 (1.10)	-0.30 (1.39)
5. Coherence/clarity of module	3.84 (1.14)	3.58 (0.99)	-0.25 (1.08)
6. Overall impression	3.82 (1.04)	3.51 (0.86)	-0.31 (1.16)
Average (Dimensions 1 to 5)	3.86 (0.86)	3.49 (0.82)	-0.37 (0.98)

When examining the elementary results, means for each dimension were greater for the 2017–2018 school year than for the 2018–2019 school year (see Table 5.6). More specifically, means decreased by nearly one point (-0.78 to -0.88) for Dimensions 1 to 3, which measure the effective writing task, standards alignment, and fidelity to LDC instruction. In contrast, means decreased by about one half-point for Dimensions 4 to 6, which measured quality instructional strategies, coherence and clarity, and overall impression. As a result, mean results went from representing dimensions that were generally sufficiently present or realized to moderately present or realized. When examining results further, 25% of teachers showed no or positive change on Dimension 1 and about half showed no change or positive change on the other five dimensions (see Table 5.7). Furthermore, the largest growth was for Dimension 4, quality instructional strategies), with 12 or 30% of teachers showing positive change across the 2 years. The lowest positive growth was for the effective writing task (Dimension 1) and fidelity to LDC instruction (Dimension 2), with only five or 12.5% showing increased ratings for either of these dimensions.

Table 5.7

Counts and Percentages for the Exploratory Analysis of Modules

Dimension	Negative		No change		Positive	
	#	%	#	%	#	%
Elementary (*n* = 40)						
1. Effective writing task	30	75.0	5	12.5	5	12.5
2. Standards alignment	20	50.0	13	32.5	7	17.5
3. Fidelity to LDC instruction	22	55.0	13	32.5	5	12.5
4. Quality instructional strategies	22	55.0	6	15.0	12	30.0
5. Coherence/clarity of module	20	50.0	10	25.0	10	25.0
6. Overall impression	21	52.5	11	27.5	8	20.0
Average (Dimensions 1 to 5)	27	67.5	5	12.5	8	20.0
Secondary (*n* = 27)						
1. Effective writing task	9	33.3	4	14.8	14	51.9
2. Standards alignment	8	29.6	6	22.2	13	48.1
3. Fidelity to LDC instruction	10	37.0	13	48.1	4	14.8
4. Quality instructional strategies	9	33.3	10	37.0	8	29.6
5. Coherence/clarity of module	10	37.0	8	29.6	9	33.3
6. Overall impression	11	40.7	8	29.6	8	29.6
Average (Dimensions 1 to 5)	12	44.4	2	7.4	13	48.1
Overall (*n* = 67)						
1. Effective writing task	28	41.8	9	13.4	19	28.4
2. Standards alignment	28	41.8	19	28.4	20	29.9
3. Fidelity to LDC instruction	32	47.8	26	38.8	9	13.4
4. Quality instructional strategies	31	46.3	16	23.9	20	29.9
5. Coherence/clarity of module	30	44.8	18	26.9	19	28.4
6. Overall impression	32	47.8	19	28.4	16	23.9
Average (Dimensions 1 to 5)	39	58.2	7	10.4	21	31.3

Secondary results show a more positive picture than the one found for the elementary teachers (see Tables 5.6 and 5.7). First, results for most of the dimensions were almost flat or showed improvement. More specifically, means increased by about one half-point for Dimension 1 and Dimension 2, and went down by 0.11 or less for Dimensions 4 to 6. Only

Dimension 3, which measures fidelity to LDC, showed a moderate drop (-0.41). Second, individual teachers were more likely to show improvement across the 2 school years than they were to get lower scores (Table 5.7). For example, only about one third of teachers received a lower score on one or more of the first five dimensions, and about half of teachers showed improved ratings on Dimension 1 and/or Dimension 2. In other words, teachers showed the most improvement in the foundational aspects of the modules including the writing task and standards alignment.

We also calculated results for the Cohort 1 and Cohort 2 teachers at the elementary and secondary levels. As with the overall results for each grade band, little positive growth was found. In addition, the means at each time point were generally higher for the Cohort 2 elementary modules and the Cohort 1 secondary modules. Despite this, these results should be considered tentative because of the large differences in sample size between the cohorts. See Appendix F for further results.

5.4 Qualitative Results

Expert raters were asked to write notes about the reasoning behind their ratings for each module. This was done to assist in the consensus making process for all modules coded by more than one expert teacher, to shed light on the ratings in general, and to suggest potential ways to improve ratings in the future. The following presents key themes that emerged concerning Dimensions 1 through 5, as well as our expert raters' overall impression.

Dimension 1: Effective Writing Task

While more than 80% of the modules received ratings of 3 to 5 on this dimension, the writing task was not always realized. Modules that received low ratings tended to have less information for the expert raters to evaluate. For example, many modules lacked a background for students, an extension activity, and/or summary information on the coversheet. When provided, these components were not always clear and, in some cases, did not match the rest of the module.

Dimension 2: Standards Alignment

While standards alignment was generally good, higher ratings of 4 or 5 were more common for the secondary modules than for the elementary ones. When providing lower ratings for this dimension, the expert raters noted the following issues. First, modules tended to have reading standards, but were less likely to have key writing, science, or social studies standards that matched the task and instruction. Second, some of the modules had standards at different grade bands—primary and upper elementary or elementary and secondary—but did not always provide an explanation for this misalignment (e.g., special needs classes, remedial coursework, etc.). Third, some modules included standards from other states.

Dimension 3: Fidelity to LDC Module Instruction

One of the goals of Dimension 3 is to examine the distribution of activities and time spent on the four stages of the LDC instructional practice (preparation for the task, reading process, transition to writing, and writing process). Modules that received low ratings tended to be missing skills and mini-tasks that our expert teachers thought were necessary to meet the writing task and standards. In some cases, modules had skills listed, but did not provide a mini-task, or the mini-task(s) provided had scant information about the planned instruction. Low-rated modules also lacked additional information in the module summary, background, extension, and/or reflection from which to judge the reason(s) for the omissions.

Dimension 4: Quality Instructional Strategies

Modules that received high ratings of 4 or 5 for this dimension were noted to be thorough and detailed, and were sometimes noted to have student work that reflected this quality. In contrast, modules that received low ratings of 1 or 2 often had minimal details and/or student work that did not reflect the strategies. In some instances, expert teachers also noted that instructional strategies did not match the task, were not specific to the lesson, and/or did not match the grade level or grade band specified. Finally, raters noted that it was more difficult to determine whether the strategies were realized when only one student work sample was attached, or the attachments only reflected one level (e.g., only advanced).

Dimension 5: Coherence and Clarity of Module

Modules that received low ratings of 1 or 2 for Dimension 5 tended to have weaknesses across the other dimensions and components. For example, expert raters tended to notice issues with the quality of the writing task, standards alignment, skills, and instructional strategies. Raters also noted issues with student work not matching other components, or providing limited evidence for the goals of the lesson being met.

Dimension 6: Overall Impressions

Modules that received the highest rating of 5 for Dimension 6 were frequently described in very positive terms. Expert raters called these modules strong, focused, great, well planned, and thorough. In addition, during debriefings expert raters talked about how these modules were ready to implement. In contrast, modules that received low ratings of 1 or 2 tended to receive comments about being incomplete or missing many or most of the expected components. In some cases, comments started out stronger, but raters found that the skills, instruction, and/or student work did not realize the potentials of the module.

5.5 Summary of Results

Based on the primary analyses, the program as a whole did not show growth in the quality of modules between 2017−2018 and 2018−2019. More specifically, average quality for the elementary modules went down by nearly a point (4.11 to 3.22) and the quality of the

secondary modules stayed basically the same (3.68 to 3.61). In other words, elementary modules went from being sufficiently present or realized to being moderately present or realized, and secondary modules stayed moderately present or realized. Despite this, it is notable that more than one third of the elementary modules (36% to 48%) and more than half of the secondary modules (53% to 65%) received ratings of 4 or 5 on the dimensions, representing features that are sufficiently to fully present or realized.

Differences in quality were also found when examining results by subgroup. For example, the elementary sample tended to show higher quality for ELA or science modules, and for those submitted by teachers at Cohort 2 schools. In contrast, differences were found by dimension for the secondary modules. More specifically, the highest means for Dimensions 1 and 2, which focus on the writing task and standards, were found for secondary ELA and Cohort 1. Furthermore, the highest means for Dimension 5, which measures coherence and clarity, were found for the secondary social studies modules, as well as those developed by Cohort 1 teachers who began in 2017−2018. Despite this, because of the variation in sample sizes, these differences should be considered tentative.

An exploratory analysis was also conducted to examine growth in performance for the 40 elementary teachers and 27 secondary teachers who submitted complete modules with student work during both the 2017−2018 and 2018−2019 school years. As with the primary analysis, the longitudinal analysis showed different results for the two grade band samples. More specifically, module quality for the elementary teachers went down by nearly one point (0.78 to 0.88) on Dimensions 1 to 3 and nearly a half-point on Dimensions 4 to 6. In contrast, the secondary teachers showed a moderate drop (0.41) in quality for Dimension 3, and was flat for Dimensions 4 to 6. More positively, secondary teachers did show growth of nearly half a point for Dimensions 1 and 2, indicating that they became more successful at developing their writing tasks and aligning standards.

6.0 Fidelity of Implementation Analysis

This chapter describes the results of a broad analysis of the LDC schools' fidelity of implementation to the LDC model. As part of the Department of Education's requirements, CRESST and LDC collaborated to create a fidelity matrix to measure schools' fidelity of implementation across four key components of the LDC model. Within the matrix, each key component is measured via multiple indicators, with 14 indicators total across the key components. The key components, as depicted in the LDC logic model (see Figure 1.1) and described in Chapter 1 are (a) common planning time for LDC professional learning community with synchronous coach support; (b) asynchronous support from LDC coaches; (c) teacher implementation activities; and (d) leadership support.

The fidelity matrix can be found in Appendix G. The matrix outlines a process whereby fidelity scores on each indicator are computed for each school and for the program as a whole. The matrix also produces a score for whether the program met fidelity for each of the four components. Although the process produces school-level fidelity scores for all indicators, the initial unit of implementation is either teacher, module, or school depending on the indicator. LDC and CRESST staff worked collaboratively to construct the fidelity matrix, with LDC staff setting the thresholds for adequate implementation on each indicator and at each level of implementation (teacher/module, school, and program).

Data for these 14 fidelity indicators come from four sources. Three indicators are based on data collected via CRESST's teacher survey. Data on these selected survey items are used to produce school- and program-level fidelity scores. Three indicators are based on data from the PLC reflection form collected by LDC, which was filled out by teacher leaders at the school level and used to capture information on both full PLC sessions and one-on-one planning and progress calls between teacher leaders and coaches. Two indicators are based on LDC administrative records capturing attendance by teacher leaders and administrators at in-person meetings occurring four times per year. Finally, six indicators are based on LDC's CoreTools analytic data capturing a variety of behaviors including teachers' viewing of LDC online course content in the LEARN portion of CoreTools, editing of modules, and uploading of student work; and coaches' commenting and providing peer review on modules. This report explores and presents the overall amount of editing and commenting behavior of teacher participants in Chapter 4. Here we focus on whether participants edited key portions of the module, as well as the comments provided by coaches on modules as a measure of their asynchronous feedback.

In this chapter, we first present the overall results for the school- and program-level fidelity scores for all the indicators. We then provide more detailed descriptive results with sections for each of the four key components and subsections for each of the 14 fidelity metrics. Next, we compare fidelity of implementation results to the prior year (2017–2018). We then explore the relationship between the fidelity of implementation indicators and residuals

derived from the pooled Cohorts 1 and 2 elementary and middle school analysis on student ELA scores. This is done both at the school and teacher levels. Finally, we summarize results.

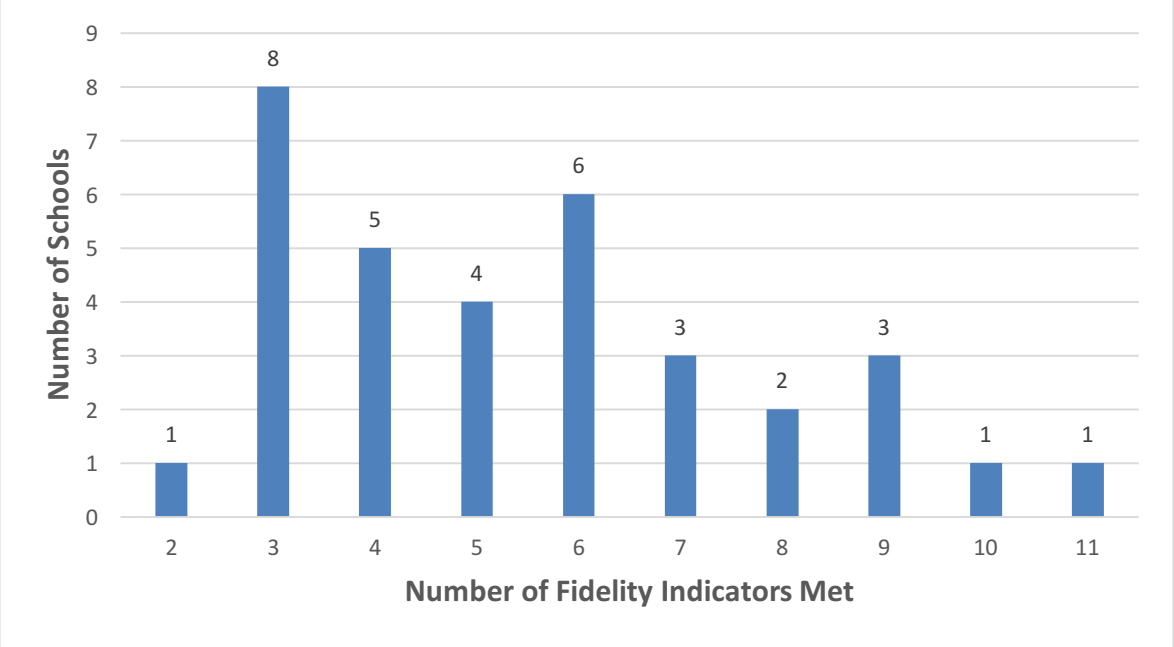
6.1 School- and Program-Level Fidelity of Implementation Scores

Table 6.1 provides a summary for how LDC schools performed across the four key components and 14 indicators of fidelity of implementation. As described in detail in the fidelity matrix in Appendix G, schools were rated on 4-point scales (from 0 to 3) on each indicator. At the school level, adequate implementation was defined as a score of at least 2. For many of the indicators, the 4-point scale is based on the proportion of teachers who met a certain implementation threshold. In order for the program as a whole to meet fidelity on a particular indicator, a designated proportion of schools had to meet the school-level threshold of 2. For example, program-level fidelity for the Key Component 2 indicators were each met if half or more of the schools met fidelity. For all the other indicators (under Key Components 1, 3, and 4) program-level fidelity was met if three quarters of schools met fidelity.

As displayed in Figure 6.1, there was great variation across schools in their success in meeting the implementation thresholds. Schools met fidelity on a range of between two and 11 indicators. On average schools met fidelity on 5.5 indicators. A total of 16 schools met fidelity on six or more indicators. Furthermore, no schools met fidelity on more than 11 indicators, which suggests that all participating schools had room for growth.

Figure 6.1

Frequency Distribution of Schools Reaching Adequate Implementation on Different Numbers of Fidelity Indicators



When examining the overall results concerning fidelity of implementation, a majority of the schools were not able to meet the adequate implementation thresholds (see Table 6.1). For fidelity to be met on a key component, the fidelity matrix requires that fidelity be met on each of the indicators for that key component. As a result, the analysis for 2018–2019 concludes that fidelity was not met for the four key components across the LDC schools.

Examining the fidelity scores by indicator, we found that adequate implementation at the program level was met on just two of the 14 indicators: teacher perception of the helpfulness of coach written feedback on modules and teacher leader attendance at quarterly in-person teacher leader meetings. A third indicator, which focuses on coach comments on modules, was on the cusp of meeting fidelity. A majority of the schools also met the threshold for perceived effectiveness of engagement in PLC on teacher competencies and administrator attendance at quarterly in-person administrator meetings, although those proportions were not sufficient for the program to be labeled as having adequate implementation on those indicators. For all the other indicators, a minority of the schools met the threshold.

Table 6.1

Summary Table of School- and Program-Level Fidelity Scores by Indicator in 2018–2019

Key component	Indicator	% of schools					Program met fidelity?
		With no data	At Level 0	At Level 1	At Level 2	At Level 3	
Key component 1: Common planning time for LDC professional learning community with synchronous coach support	Teacher attendance at weekly PLC meetings	9	38	6	18	29	No
	Amount of time spent on LDC during common planning time	0	0	56	41	3	No
	Exposure to LDC LEARN content during first instructional cycle	0	85	3	6	6	No
	Exposure to LDC LEARN content during second instructional cycle	0	88	0	6	6	No
	Perceived effectiveness of engagement in PLC on teacher competencies	3	18	18	27	35	No
Key component 2: Asynchronous support from LDC coaches	Coach comments on modules	0	38	12	12	38	No[a]
	Coach formative peer review on modules	0	94	3	3	0	No
	Teacher perception of the helpfulness of coach written feedback on modules	3	35	3	20	38	Yes
Key component 3: Teacher implementation activities	Module editing	0	74	9	12	6	No
	Module implementation	0	88	3	6	3	No
Key component 4: leadership support at different levels	Frequency of coach/teacher leader monthly meetings	0	6	53	29	12	No
	Administrator attendance at quarterly in-person administrator meetings	0	6	24	24	47	No
	Teacher leader attendance at quarterly in-person teacher leader meetings	0	0	12	21	68	Yes
	Principal mini-task observation	3	47	6	18	27	No

[a]Metric was on the cusp of meeting fidelity at the program level in 2018−2019.

6.2 Key Component 1: Common Planning Time for LDC Professional Learning Community with Synchronous Coach Support

Schools varied greatly in their level of fidelity on the five indicators of Key Component 1, as shown in Figure 6.2. Schools were most successful with regard to teachers' perceptions of the impact of PLC engagement on their skills (*perceived effectiveness of engagement in PLC on teacher competencies*), with 21 out of 34 (62%) of the schools meeting adequate implementation on the indicator. A substantial minority of the schools also met fidelity on *teacher attendance at weekly PLC meetings* (47%) and *amount of time spent on LDC during common planning time* (44%). Meeting fidelity on the indicators of exposure to LDC LEARN content was uniformly challenging for most schools, with only a handful of schools reaching the adequate implementation threshold in each case.

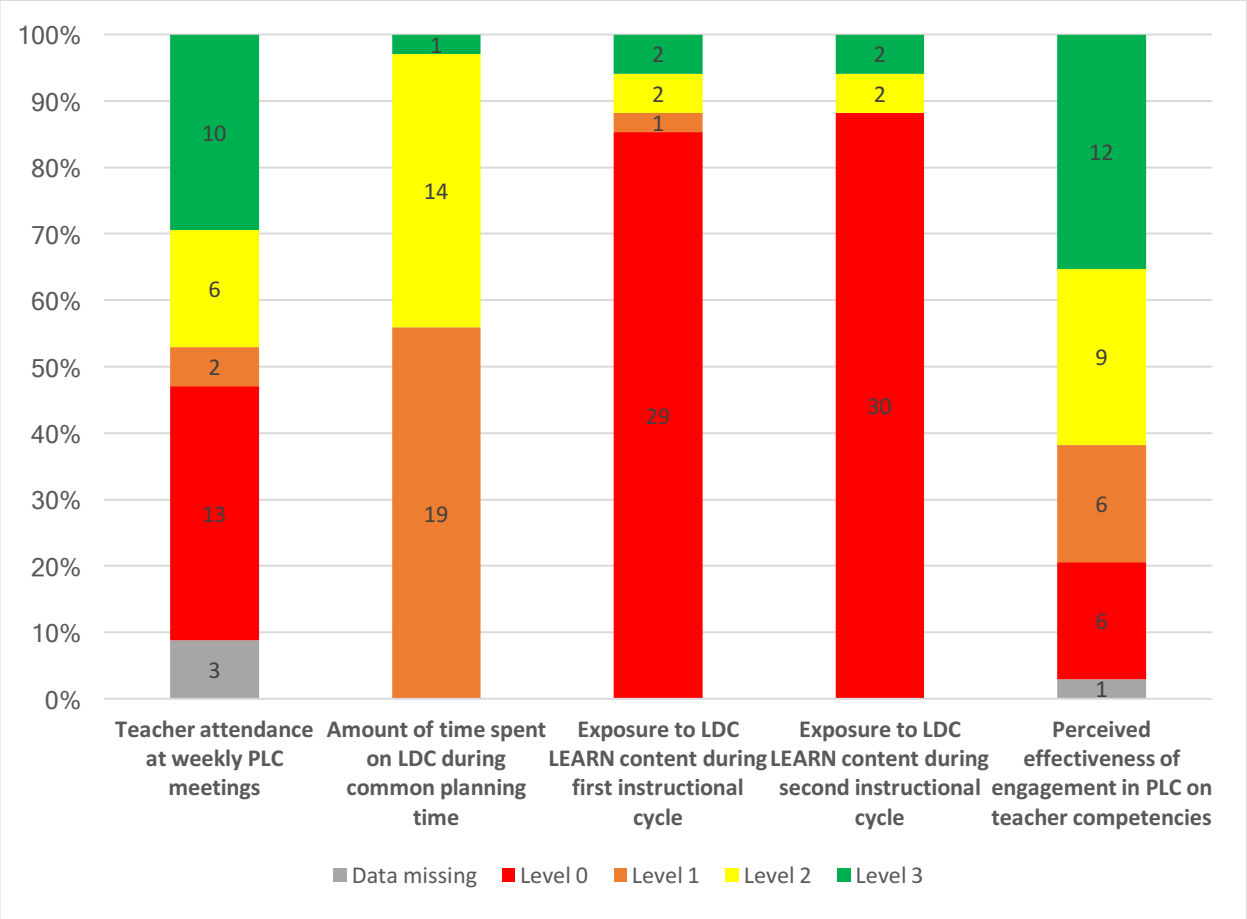
Teacher Attendance at Weekly PLC Meetings

PLC reflection data show that schools varied greatly in terms of the number of times their PLCs met over the course of the 2018–2019 school year. The number of sessions ranged from four to 20 times, with PLCs on average meeting 12.6 times. This is important context for the interpretation of the *teacher attendance at weekly PLC meetings* fidelity indicator. The indicator measures the proportion of teachers who regularly attended sessions, but does not incorporate the number of times that the PLC met across the year. Success in these two facets are somewhat correlated, but there were many cases where teacher attendance rates were high but the school met a below average number of times. Likewise, there were cases where schools met a large number of times but individual attendance rates were poor.

Attendance rates across the full population of PLC participants varied a great deal, ranging from zero to 100% and averaging 78%. Classroom teachers playing an LDC teacher leader role (n = 33, 91%) attended at higher levels than did classroom teachers not playing a leadership role (n = 218, 76%). Teacher leaders in out-of-classroom assignments (n = 5) attended least frequently (64%). The adequate implementation threshold for individual teacher attendance was 80% or greater, and 168 out of 256 PLC participants (66%) reached this threshold. As seen in Figure 6.2, while a majority of teachers in a majority of schools reached this threshold, there was a very substantial minority of schools that experienced low attendance rates. More specifically, in nearly 40% of schools, less than a quarter of the teachers reached the adequate implementation threshold of an 80% attendance rate.

Figure 6.2

Number of Schools Reaching Different Fidelity Levels for Each Key Component 1 Indicator



Amount of Time Spent on LDC During Common Planning Time

This metric is based on PLC reflection data for the subset of PLC sessions that coaches joined either digitally or in person. Data on sessions and their lengths were missing for three of the participating schools. Teacher leaders in the remaining 31 schools reported that 33 sessions were under 45 minutes long (9%), 167 sessions were between 45 and 59 minutes (44%), 151 sessions were between 60 and 74 minutes (39%), and 32 sessions were between 75 and 90 minutes (8%).

School-level scores were based on the modal (most common) response on the PLC reflection form. For 19 of the schools that response was 45–59 minutes, for 14 schools the most common response was 60–74 minutes, and one school met most frequently for 75–90 minutes. Because of the nature of the data, we cannot ascertain the exact length of the sessions. As such it is possible that many of the sessions recorded as 45–59 minutes came quite close to the

desired 60 minutes of PLC time. Nevertheless, according to the thresholds set, a majority of the schools did not meet fidelity on this indicator.

Exposure to LDC LEARN Content During First and Second Instructional Cycles

Here we report on the two indicators measuring PLC participants' engagement with the LEARN online course content (instructional courses that help LDC participants learn how to navigate an LDC instructional cycle). Nearly all (94%) teachers and teacher leaders participating in LDC PLCs in 2018–2019 viewed at least one session in each of two instructional cycles. Overall the full population of teachers and teacher leaders on average were exposed to 41% of the LEARN sessions in the first instructional cycle and 33% of the LEARN sessions in the second instructional cycle. This represents a marked improvement over the prior year, when participants on average were exposed to 18% of LEARN sessions in the first instructional cycle and 9% in the second instructional cycle. Despite this improvement in the average exposure, the great majority of teachers and teacher leaders were still not meeting the fidelity threshold of exposure to 60% of instructional cycle sessions. Only 27% of participants met this threshold for the first instructional cycle, and 18% of participants met it for the second instructional cycle.

Overall a total of four schools met the adequate implementation threshold for the first instructional cycle (scoring at Fidelity Levels 2 and 3) and four schools met the threshold for the second instructional cycle (three of the four schools were the same across both cycles). Nearly all the remaining schools scored at the lowest fidelity score level.

Perceived Effectiveness of Engagement in PLC on Teacher Competencies

This indicator is based on the 224 teachers who provided data on Question 30 in the teacher survey (see Appendix A), which asks teachers to report how much their skills had improved in a number of areas aligned with LDC core competencies. Here we base fidelity levels on an index averaging the seven survey items (see Question 30 in Appendix A), which are each measured on a scale of 1 to 4. The threshold for adequate implementation at the teacher level is an index score of 3, corresponding to the survey response reporting moderate improvement in the skill area. Across the whole sample, six teachers (3%) had scores of 1 to less than 2 (no to a little improvement), 47 (21%) had scores of 2 to less than 3 (a little to moderate improvement), 121 (54%) had scores of 3 to less than 4 (moderate to great improvement), and 50 (22%) had scores of 4 (great deal of improvement). Over three quarters of respondents in the sample reached the adequate implementation threshold score of 3 or greater on the index.

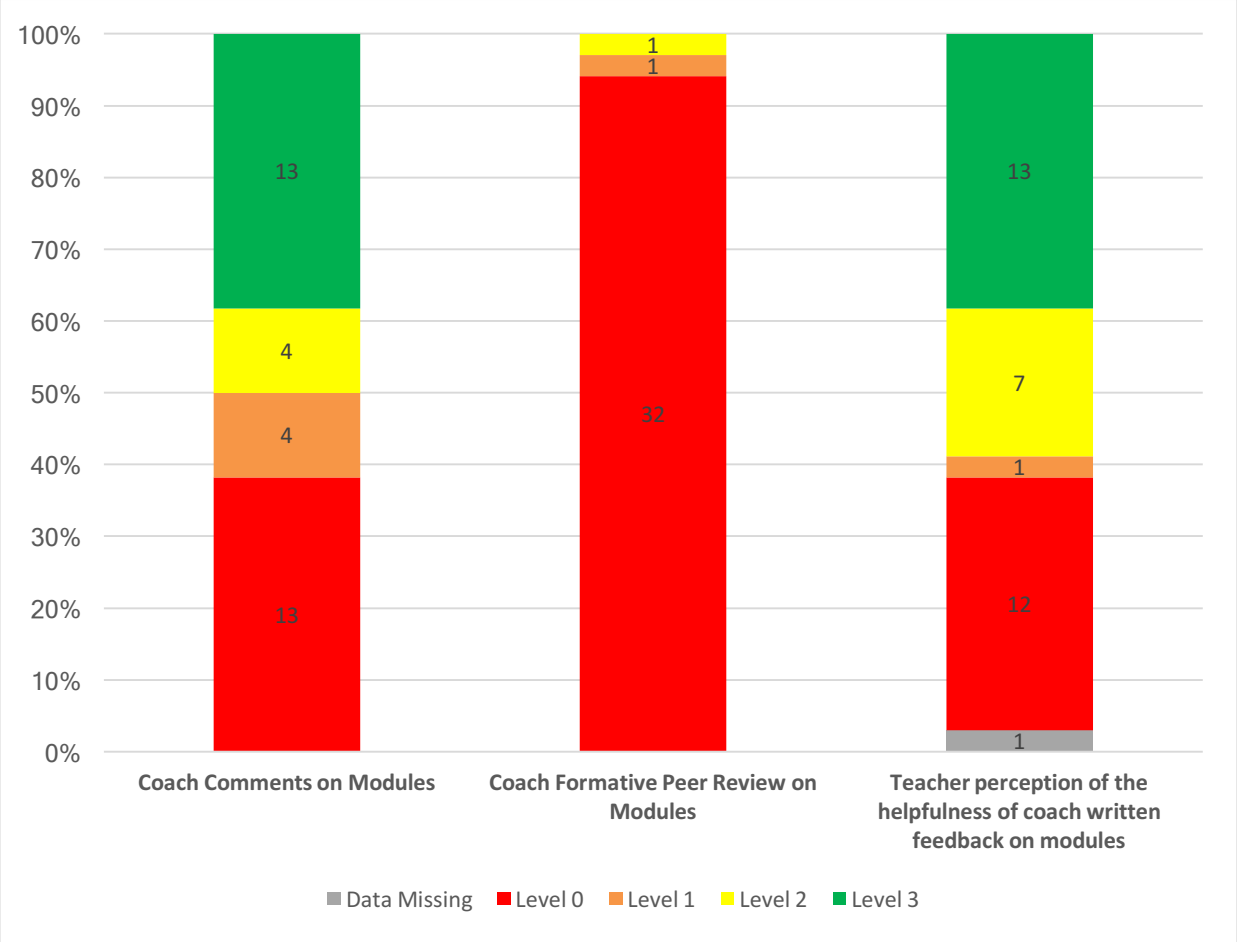
There was a great deal of variation in survey responses both within and across schools. In 12 schools, half or fewer of the teachers reported a moderate effect on the competencies. On the other hand, 100% of respondents in 10 schools reported a moderate or greater effect. The variation can be clearly seen in Figure 6.2. Despite the large proportion of teachers who reported that LDC had an impact on their competencies, less than two thirds of the schools had three quarters or more of their teachers report a moderate impact.

6.3 Key Component 2: Asynchronous Support From LDC Coaches

As with Key Component 1, there was a great deal of variation across schools in their level of fidelity on the three Key Component 2 indicators, as shown in Figure 6.3. Data indicated high fidelity on the *teacher perception of the helpfulness of coach written feedback on modules* indicator, one of only two indicators for which the program as a whole met fidelity. Twenty out of 34 schools (59%) met fidelity on this indicator. In addition, the program nearly met fidelity on *coach comments on modules*, with half of schools meeting the adequate implementation threshold. Coach peer review was not a broadly used tool, and as a result only one school met fidelity on this indicator.

Figure 6.3

Number of Schools Reaching Different Fidelity Levels for Each Key Component 2 Indicator



Coach Comments on Modules

Results on this indicator are based on the universe of modules edited at least once during the 2018–2019 school year and linked to a LEARN instructional cycle. In total there were 158

modules linked to courses across 33 of the 34 schools (one school did not have any teachers edit modules at least once and link to a LEARN instructional cycle), with the number of linked modules per school ranging from one to 19. Those modules in turn received between zero and 14 comments from coaches. An adequate level of feedback on a linked module was defined as having received two or more coach comments, and 94 out of the total 158 modules (60%) met that threshold. The proportion of modules within schools that met the two-comment threshold varied a great deal across schools, which accounts for the variation in school-level fidelity scores as shown in Figure 6.3.

Coach Formative Peer Review on Modules

Results on this indicator are based on the universe of teachers and teacher leaders who coauthored at least one linked course. That population includes 182 participants across 33 of the 34 schools (one school did not have any teachers with modules linked to courses). At the teacher level, fidelity was defined as having received at least one peer review from a coach. Only 39 teachers received at least one peer review from their coach, with only one of the schools meeting the school-level fidelity threshold.

Teacher Perception of Helpfulness of Coach Written Feedback on Modules

Across 224 teacher survey respondents, 154 teachers (69%) reported using written feedback on modules and finding it moderately to very helpful. Across schools, the proportion of teachers who reported at least moderate usefulness ranged from zero to 100% with a mean of 71%. Twenty out of 34 schools met the adequate implementation threshold, and as a result this was one of two indicators for which the program as a whole met the fidelity requirement.

6.4 Key Component 3: Teacher Implementation Activities

Here we report on indicators related to teachers' engagement with the process of designing and implementing LDC modules. As shown in Figure 6.4, schools were more successful in terms of meeting thresholds for the proportion of their teachers who engaged deeply in the design process by editing key portions of modules, with almost a fifth of schools meeting fidelity on this indicator. In contrast, only three of the schools had three quarters or more of their teachers implement two modules, as measured by the uploading of student work samples.

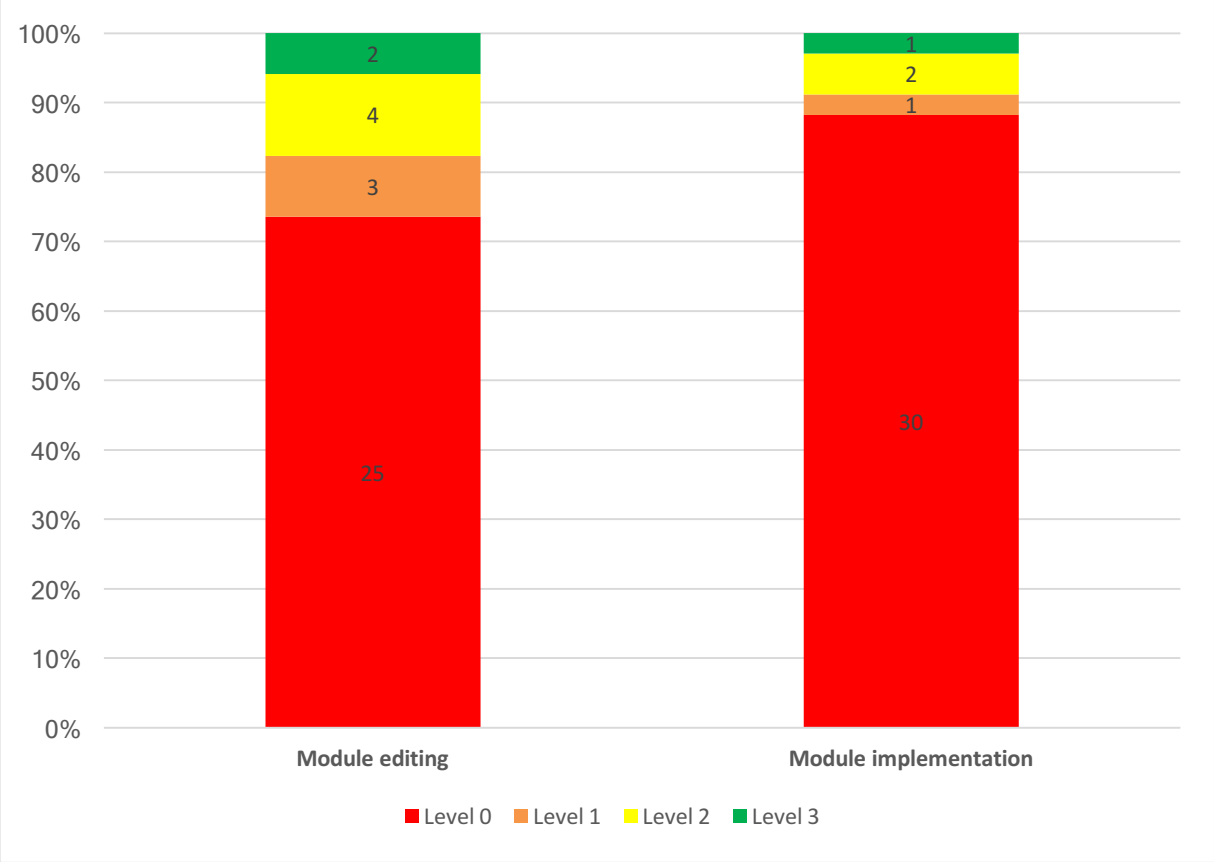
Module Editing

As outlined in the fidelity matrix, teacher fidelity levels are built in a stepladder fashion. Teachers meeting Fidelity Level 1 were required to edit at least one task in a module. Teachers meeting Fidelity Level 2 (adequate implementation) were required to meet Fidelity Level 1 and edit either standards or texts in at least one module; teachers at this level did not edit either skills/mini-tasks or rubrics. Finally, teachers meeting Fidelity Level 3 met the previous two requirements (editing at least one task and standards or texts) and also edited skills/mini-tasks and/or the rubric.

A total of 138 participants (51%) failed to meet the threshold of editing the teaching task in one module and therefore implemented at a fidelity level of zero. Twenty participants (7%) edited a task, but did not edit standards or texts, and therefore were at Fidelity Level 1. A total of 111 participants (41%) met the adequate implementation threshold, with 25 (9%) scoring at Level 2 (edited standards or texts) and 86 (32%) scoring at Level 3 (edited standards or texts *and* skills/mini-tasks or rubric). As a result, overall less than half of participants met the teacher-level adequate implementation threshold, and less than one out of five schools met the school-level threshold for adequate implementation. It is important to note that in response to teachers collaborating on and implementing common modules in schools, LDC refined its data collection in the summer of 2018 to include tracking engagement data on modules that teachers collaborated on. The fidelity matrix, and CRESST's analyses of editing data, were not designed to capture this shift toward a collaborative model of instructional design in CoreTools, and therefore may not fully capture engagement in the design process.

Figure 6.4

Number of Schools Reaching Different Fidelity Levels for Each Key Component 3 Indicator



Module Implementation

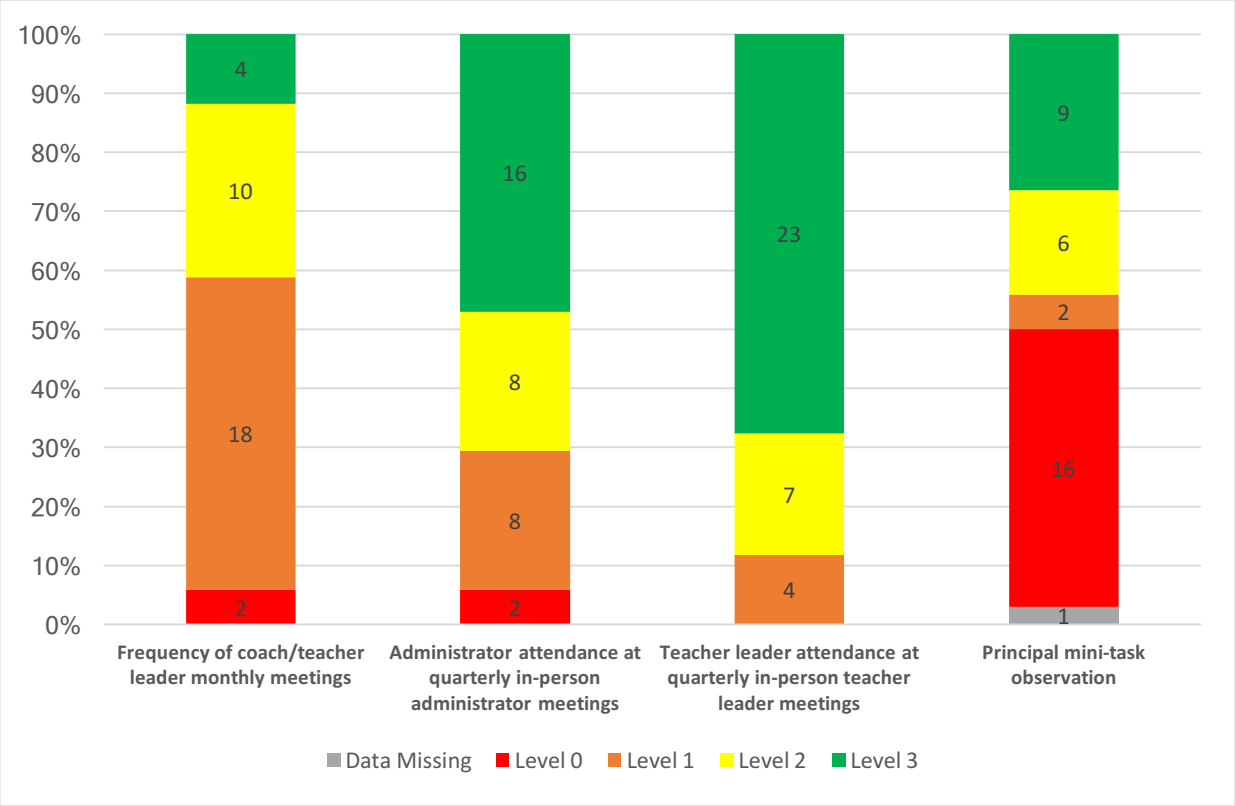
For this indicator, our sample includes the 264 classroom teachers who participated in LDC in 2018–2019 (as the metric involves classroom implementation, out-of-classroom staff are excluded). In this case, the uploading of student work served as a proxy for whether the teacher implemented a module in their classroom. The number of modules with uploaded student work ranged from 0 to 4 with a mean of just over 1. One hundred eight teachers (40%) didn't upload student work to any modules. Seventy (27%) uploaded student work to one module, and 63 (24%) uploaded to two modules. Thirty-three teachers (9%) uploaded student work to three or more modules. Overall, just one third of teachers met the adequate implementation threshold, and as a result only 9% of schools met fidelity on the indicator.

6.5 Key Component 4: Leadership Support at Different Levels

As depicted in Figure 6.5, there was a high level of fidelity with regard to the attendance of teacher leaders at quarterly in-person meetings. Results, however, were considerably less positive for the other three indicators of leadership support, with an insufficient number of schools meeting the adequate implementation threshold on each to meet program fidelity.

Figure 6.5

Number of Schools Reaching Different Fidelity Levels for Each Key Component 3 Indicator



Frequency of Coach/Teacher Leader Monthly Meetings

Teacher leaders reported meeting with their coach between zero and 19 times with a mean of 8.7 times, according to the PLC reflection data. The adequate implementation threshold was set at nine or more coach/teacher leader meetings across the school year, and only 14 of 34 schools (41%) met that threshold. Eighteen of 34 schools (53%) met between four and eight times (low implementation) and two (6%) met less than four times (very low implementation).

Administrator Attendance at Quarterly In-Person Administrator Meetings

Administrators had the opportunity to attend three administrator training events. Administrators in 16 schools (47%) attended all three events, in eight schools (24%) attended two events, in eight schools (24%) attended one event, and in two schools (6%) administrators attended zero events. With the adequate implementation threshold set at two of three events, 24 out of 34 schools (71%) met the threshold.

Teacher Leader Attendance at Quarterly In-Person Teacher Leader Meetings

Teacher leaders also had the opportunity to attend three teacher leader training events. Teacher leaders attended all three events in 23 schools (68%), attended two events in seven schools (21%), and attended one event in four schools (12%). With adequate implementation again set at two of three events, 30 out of 34 schools (88%) met the threshold.

Principal Mini-Task Observation

Teachers were asked to report how many times their administrator observed their teaching of an LDC mini-task. Thirty-eight percent of survey respondents reported never having been observed by an administrator when teaching an LDC mini-task, 22% reported being observed once, 25% reported being observed twice, and 15% reported being observed three or more times. Under the fidelity matrix, 100% of teachers had to be observed for the school to meet fidelity, and only 44% of schools met this threshold.

6.6 Change in Fidelity of Implementation From 2017–2018 to 2018–2019

Here we explore change over time in how the program performed on the 14 different fidelity metrics. Table 6.2 displays the proportion of schools that met fidelity thresholds in 2017–2018 and 2018–2019, and whether the program as a whole met fidelity on the metric in each year. It is important to note that the 2 years of analysis are based on two different samples of schools. Eleven schools that participated in LDC in 2017–2018 did not continue with the program in 2018–2019. Therefore, the 2018–2019 sample includes 34 schools, compared to 45 schools in 2017–2018.

In each of the 2 years, the program met fidelity on two of the four metrics. Fidelity was met both years on teacher leader attendance at quarterly in-person teacher leader meetings, while the program met fidelity on administrator attendance at quarterly in-person

administrator meetings in 2017–2018 only, and on teacher perception of the helpfulness of coach written feedback in 2018–2019 only.

Overall, the percentage of schools that met fidelity increased for eight metrics and decreased for six metrics. Some of the most notable improvements over time were seen on the three survey-based fidelity metrics, with schools more likely to meet fidelity on the perceived effectiveness of PLCs on teacher competencies, the perceived helpfulness of written feedback by coaches, and the extent of principal observations. There was also evidence that the program was successful in exposing more teachers to instructional course content, although only a small proportion of schools met adequate implementation on these metrics.

Table 6.2

Summary Table Displaying Fidelity of Implementation by Metric and Year

Key component	Indicator	2017–2018		2018–2019	
		% of schools that met fidelity threshold (*n* = 45)	Program met fidelity?	% of schools that met fidelity threshold (*n* = 34)	Program met fidelity?
Key component 1: Common planning time for LDC professional learning community with synchronous coach support	Teacher attendance at weekly PLC meetings	53	No	47	No
	Amount of time spent on LDC during common planning time	38	No	44	No
	Exposure to LDC LEARN content during first instructional cycle	0	No	12	No
	Exposure to LDC LEARN content during second instructional cycle	0	No	12	No
	Perceived effectiveness of engagement in PLC on teacher competencies	44	No	62	No
Key component 2: Asynchronous support from LDC coaches	Coach comments on modules	44	No	50	No[a]
	Coach formative peer review on modules	9	No	3	No
	Teacher perception of the helpfulness of coach written feedback on modules	31	No	59	Yes
Key component 3: Teacher implementation activities	Module editing	27	No	18	No
	Module implementation	13	No	9	No
Key component 4: Leadership support at different levels	Frequency of coach/teacher leader monthly meetings	29	No	41	No
	Administrator attendance at quarterly in-person administrator meetings	82	Yes	71	No
	Teacher leader attendance at quarterly in-person teacher leader meetings	96	Yes	88	Yes
	Principal mini-task observation	22	No	44	No

[a]This metric was on the cusp of meeting fidelity at the program level in 2018−2019.

6.7 Exploratory Analysis of the Relationship Between Implementation Metrics and Student Outcomes

Here we explore the relationship between fidelity of implementation indicators and student ELA outcome scores at both the school and teacher level. In order to examine these relationships, we produced school and teacher residuals, which are estimates of individual schools' and teachers' contributions to student ELA scores (i.e., schools' and teachers' effectiveness in impacting student achievement), holding the other variables in the analysis model constant.

Two MMMC models were used: one to produce individual estimates for each LDC school and one to produce individual estimates for each LDC teacher. The models utilized the analytic sample of Cohort 1 and Cohort 2 elementary and middle school teachers and students reported on in Table 7.3 (the largest sample for our primary quasi-experimental analyses). That model measured outcomes for Cohort 1 teachers in 2017–2018 and Cohort 2 teachers in 2018–2019. The models we used to produce the school and teacher residuals were identical to our outcome models with two exceptions: (a) the LDC treatment variable was removed from the equation; and (b) one classification level was removed for each of the two models. In the model to produce school-level estimates we removed the teacher classification level. Similarly, in the model to produce teacher-level estimates, we removed the school classification level.

The school and teacher residuals from the respective models were used as the estimates of effectiveness, after adjustment by all the model covariates. These residuals are sometimes referred to as best linear unbiased predictors (BLUPs) in the relevant literature (Robinson, 1991). Because the residuals are obtained from our analytic samples, which exclude many participating schools and teachers for a variety of reasons (e.g., lack of prior or outcome scores; teaching a subject other than ELA, social studies, or science), the resulting estimates represent a subset of all schools and teachers who participated in 2017–2018 or 2018–2019. Residuals were produced for 25 out of 45 schools (56%) which participated in at least 1 of the 2 years, and 75 out of the 389 teachers who participated in 1 of the 2 years (19%).

As with the outcome data, fidelity data for this exploratory analysis came from 2 years: 2017–2018 for Cohort 1 schools and teachers and 2018–2019 for Cohort 2 schools and teachers. For the school-level examination of the relationship between fidelity and outcomes, we included school-level versions of the 14 fidelity matrix indicators, each measured using a 4-point scale of 0 to 3. We examined the distribution of school-level residuals and divided them into three categories: nine low-achieving schools with residuals of less than -0.10, six middle-achieving schools with residuals between -0.10 and 0.10, and 10 high-achieving schools with residuals greater than 0.10. We then produced mean implementation scores on each indicator for the three achievement groups, which are displayed in Table 6.3. A descriptive examination of the school means did not reveal any consistent pattern between the implementation scores and achievement levels. We also conducted a one-way ANOVA to test whether the differences

in means between the three groups were significant. These tests only found a statistically significant difference on one indicator, and this result may be an artifact of conducting multiple comparisons. In summary, the analysis provided no evidence of a link between school-level fidelity of implementation on the matrix indicators and school-level effectiveness.

Table 6.3

Mean School-Level Fidelity Scores by Indicator and Achievement Group

Key component	Fidelity indicator	Low-achieving schools (*n* = 9)		Middle-achieving schools (*n* = 6)		High-achieving schools (*n* = 10)		Difference in means significant at 5% level
		M	*N*	*M*	*N*	*M*	*n*	
Key component 1: Common planning time for LDC professional learning community with synchronous coach support	Teacher attendance at weekly PLC meetings	1.67	9	0.67	6	0.89	9	No
	Amount of time spent on LDC during common planning time	1.22	9	1.33	6	1.40	10	No
	Exposure to LDC LEARN content during first instructional cycle	0.00	9	0.50	6	0.30	10	No
	Exposure to LDC LEARN content during second instructional cycle	0.00	9	0.83	6	0.00	10	Yes
	Perceived effectiveness of engagement in PLC on teacher competencies	2.00	9	2.00	6	1.44	9	No
Key component 2: Asynchronous support from LDC coaches	Coach comments on modules	1.89	9	1.50	6	1.38	8	No
	Coach formative peer review on modules	0.00	9	0.33	6	0.11	9	No
	Teacher perception of the helpfulness of coach written feedback on modules	1.56	9	1.17	6	1.44	9	No
Key component 3: Teacher implementation activities	Module editing	0.22	9	0.83	6	0.70	10	No
	Module implementation	0.22	9	0.17	6	0.20	10	No
Key component 4: Leadership support at different levels	Frequency of coach/teacher leader monthly meetings	1.56	9	1.50	6	1.00	10	No
	Administrator attendance at quarterly in-person administrator meetings	2.89	9	2.50	6	2.50	10	No
	Teacher leader attendance at quarterly in-person teacher leader meetings	2.89	9	2.50	6	2.40	10	No
	Principal mini-task observation	1.67	9	1.33	6	1.11	9	No

Table 6.4

Mean Values on Teacher-Level Variables Associated With Fidelity Indicators by Achievement Group

Fidelity indicator	Teacher-level variable	Low-achieving teachers (*n* = 28)		Middle-achieving teachers (*n* = 27)		High-achieving teachers (*n* = 33)		Difference in means significant at 5% level
		M	*N*	*M*	*n*	*M*	*n*	
Teacher attendance at weekly PLC meetings	PLC attendance rate	0.86	23	0.77	24	0.76	26	No
Exposure to LDC LEARN content during first instructional cycle	Exposure rate for instructional course 1 sessions	0.33	28	0.29	27	0.37	33	No
Exposure to LDC LEARN content during second instructional cycle	Exposure rate for instructional course 2 sessions	0.24	28	0.22	27	0.31	33	No
Perceived effectiveness of engagement in PLC on teacher competencies	Survey-based index measuring perceived impact of PLC on teacher competencies	3.15	24	3.22	23	3.10	30	No
Coach formative peer review on modules	Number of teacher's modules that received a formative peer review	0.28	25	0.24	21	0.16	32	No
Teacher perception of the helpfulness of coach written feedback on modules	Survey-based perception of the helpfulness of coach written feedback on modules	2.75	24	2.61	23	2.60	30	No
Module editing	Module editing teacher-level fidelity score	2.21	28	1.15	27	1.55	33	Yes
Module implementation	Number of teacher's modules with uploaded student work	1.36	28	1.00	27	0.97	33	No
Principal mini-task observation	Numerical version of scale asking survey respondents about the number of times their principal observed their LDC instruction	1.38	24	1.43	23	1.23	30	No

For the teacher-level analysis, we included nine teacher variable versions of the fidelity matrix indicators (five of the 14 indicators were measured at the module or school level and therefore could not be included in the teacher-level analysis). As with the school-level analysis, we examined the distribution of residuals and divided them into three categories: 28 low-achieving schools with residuals of -0.05 or smaller, 27 middle-achieving schools with residuals between -0.05 and 0.05, and 33 high-achieving schools with residuals of 0.05 or greater. We then produced mean implementation scores on each indicator for the three achievement groups, which are displayed in Table 6.4.

Again, as with the school-level analysis, a descriptive examination of the means did not reveal any consistent pattern between implementation scores and achievement levels. We also conducted a one-way ANOVA to test whether the differences in means between the three groups were significant. These tests only found a statistically significant difference on one indicator, and this result may be an artifact of conducting multiple comparisons. The analysis provided no evidence of a link between teacher-level fidelity of implementation on the matrix indicators and teacher-level effectiveness.

6.8 Summary of Results

In summary, our analysis revealed that none of the schools met fidelity requirements on the four key components in 2017–2018 in the West Coast district. The ability of PLCs to set aside common planning time that worked for all teachers varied across schools. The frequency of meetings ranged broadly, as did the attendance rates of the participants. While many schools were able to maintain high attendance rates, a majority did not meet the desired attendance threshold. When PLCs did meet, they most often met for 45 to 59 minutes, although many sessions also lasted the desired 60 minutes or more. LDC intended for teachers to be exposed to key online course content within PLC time, and this year's fidelity analysis showed substantial improvement at the teacher level on these metrics. The vast majority of schools, however, still did not meet the adequate implementation thresholds for the instructional course exposure metrics. A majority of schools met fidelity in terms of teachers' perception of the impact of LDC on their skills, representing a marked improvement over the prior year; nevertheless, the program as a whole did not meet fidelity on this metric.

The results reveal some improvement from 2017–2018 to 2018–2019 with regard to asynchronous support from coaches. Schools were somewhat more likely to meet fidelity thresholds regarding coaches' commenting on modules, and teachers were considerably more likely to find written feedback helpful. Peer review remained a little used function in CoreTools.

Results on module editing suggest that many teachers were not heavily engaged in the design process, with half of teachers not having edited any teaching tasks. Those that did edit the teaching task tended to also edit either standards or texts, and a third of teachers also reached the stage of editing skills/mini-tasks and the rubric. There was evidence that 60% of

teacher participants implemented modules in the classroom, but only about a third of teachers met the adequate implementation threshold of uploading student work for two modules.

Teacher leaders continued to attend professional development meetings at high levels, but there was some dropoff in engagement by administrators in professional development meetings from 2017–2018 to 2018–2019. As a result, the program no longer met fidelity on the latter indicator in 2018–2019. The program was somewhat more successful in 2018–2019 in ensuring regular contact between teacher leaders and coaches and broad engagement by administrators in observing LDC classroom implementation, but overall fidelity was still not met on these indicators.

Variation across schools was substantial. Some schools met fidelity on eight to 11 indicators, and on the other end, some schools struggled with nearly every aspect of implementation. No strong patterns emerged for the cohort and school-level subgroups with Cohort 1 and Cohort 2 schools, as well as the elementary and secondary schools meeting similar levels of fidelity, despite great variation within each of the subgroups.

Despite substantial variation across schools and teachers in fidelity of implementation across the different metrics, an exploratory analysis did not find any relationship at either the school or teacher level between fidelity and effectiveness in impacting student ELA scores.

7.0 Student Outcome Analysis

This chapter presents the student outcome analysis we conducted to evaluate the impact of LDC on student learning. As described in Chapter 2, our LDC teacher samples included both elementary and middle school teachers in two cohorts of schools in the study district. This chapter explores impacts of teachers after participating in LDC for 2 years and 3 years. Our primary analyses of the impact of LDC after 2 years pool teachers and students from both cohorts of schools. These 2-year impact analyses are conducted for all elementary school teachers, all middle school teachers, and all teachers combined across school levels. Each separate analysis included matching and regression stages. Specifically, we conducted outcome analyses for the following groups of schools, teachers, and their students:

1. Cohorts 1 and 2 elementary school sample: Teachers implementing LDC for 2 consecutive years (Cohort 1: 2016–2017 and 2017–2018; Cohort 2: 2017–2018 and 2018–2019)
2. Cohorts 1 and 2 middle school sample: Teachers implementing LDC for 2 consecutive years (Cohort 1: 2016–2017 and 2017–2018; Cohort 2: 2017–2018 and 2018–2019)
3. Cohorts 1 and 2 elementary and middle school sample: Teachers implementing LDC for 2 consecutive years (Cohort 1: 2016–2017 and 2017–2018; Cohort 2: 2017–2018 and 2018–2019)
4. Cohort 1 middle school sample: Teachers implementing LDC for 3 consecutive years (2016–2017, 2017–2018, and 2018–2019)
5. Cohort 2 elementary school sample: Teachers implementing LDC for 2 consecutive years (2017–2018 and 2018–2019)
6. Cohort 2 middle school sample: Teachers implementing LDC for 2 consecutive years (2017–2018 and 2018–2019)
7. Additional analyses based on the Cohorts 1 and 2 middle school sample: LDC students with or without prior exposure to LDC teachers and LDC students with high or low LDC dosage in the outcome year

LDC's pre-grant theory of action predicted that it would take 2 years of experience with LDC before teachers have a measurable impact on student learning.[3] As such, the first four analyses listed above constitute this study's primary tests of the impact of LDC. Analyses numbered 5 through 7 above are considered supplementary. The fifth and sixth analyses examine impact after 2 years for just the Cohort 2 schools, which joined a year later than the Cohort 1 schools, benefited from early lessons learned by the LDC team, and experienced a lower level of teacher attrition than did the Cohort 1 schools. The seventh analysis breaks the Cohorts 1 and 2 middle school sample (listed as number 2 above) into subgroups based on

[3] Of note is the fact that our prior report found a positive statistically significant impact of LDC in Cohort 2 middle schools after one year (Wang, et al. 2019)

whether students were exposed to LDC in the prior year and how much LDC instruction students were exposed to in the outcome year. We begin this chapter by describing the process we used to define the LDC student samples for each analysis and to construct matched comparison samples. We then present descriptive statistics for the treatment and comparison groups. Next, we report the estimated impact of LDC on students as measured by the Smarter Balanced scores in ELA for our primary and supplementary analyses. Finally, we summarize and contextualize the results.

7.1 LDC Sample and the Matching Process

For each analysis, the eligible LDC sample includes all students (a) who were enrolled in one school campus for the entire outcome year under the instruction of at least one of the participating LDC teachers and (b) for whom baseline achievement scores, outcome year achievement scores, and demographic data were available. Achievement and demographic data were used in the matching process. Six sets of matching were conducted, four for the primary analysis samples (elementary teachers with 2 years of LDC, middle school teachers with 2 years of LDC, combined elementary and middle school teachers with 2 years of LDC, and Cohort 1 middle school teachers with 3 years of LDC) and two for the supplementary analysis samples (Cohort 2 elementary and middle school teachers with 2 years of LDC, respectively). We present the matching results for the primary analysis samples here, with matching results for supplementary analyses displayed in Tables I1 and I2 in Appendix I.

Cohorts 1 and 2 Elementary School Sample (Teachers With 2 Years of Implementation)

Prior to the CEM process this LDC sample included 17 schools, 34 teachers, and 757 students. After the student-level matching, our final pooled elementary LDC sample included 685 students and the same number of teachers and schools prior to matching (see Table 7.1).

Prior to matching, the potential elementary school comparison sample consisted of 566 schools, 2,600 teachers, and 65,503 students. This comparison sample was substantially reduced during the first stage of matching, which identified up to five schools that closely resembled each of the LDC schools. After student-level CEM, a workable analytic comparison sample consisted of 80 schools, 230 teachers, and 685 students.

Table 7.1

Before and After Matching Sample Sizes: Cohorts 1 and 2 Elementary School Analysis for Teachers With 2 Years of LDC Implementation

	LDC sample			Comparison sample		
Stage	Schools	Teachers	Students	Schools	Teachers	Students
Stage 1						
Before school matching	17	34	757	566	2,600	65,503
After school matching	17	34	757	82	333	5,986
Stage 2						
After student matching	17	34	685	80	230	685

Cohorts 1 and 2 Middle School Sample (Teachers With 2 Years of Implementation)

As reported in Table 7.2, the resulting LDC sample for the pooled middle school teachers with 2 years of implementation included 11 schools, 54 teachers, and 3,575 students prior to the CEM process. After the CEM student-level matching, our final pooled middle school LDC sample was reduced to 3,294 students.

Prior to matching, the potential comparison sample consisted of 117 schools, 3,330 teachers, and 100,604 students. This comparison sample was substantially reduced during the first stage of matching, which identified up to five schools that most closely resembled each of the LDC schools. After student-level CEM, a workable analytic comparison sample of 38 schools, 787 teachers, and 3,294 students was constructed.

Table 7.2

Before and After Matching Sample Sizes: Cohorts 1 and 2 Middle School Analysis for Teachers With 2 Years of LDC Implementation

	LDC sample			Comparison sample		
Stage	School	Teacher	Student	School	Teacher	Student
Stage 1						
Before school matching	11	54	3,575	117	3,330	100,604
After school matching	11	54	3,575	40	1,146	31,327
Stage 2						
After student matching	11	54	3,294	38	787	3,294

Cohorts 1 and 2 Elementary and Middle School Sample (Teachers With 2 Years of Implementation)

We also conducted an analysis which pooled teachers with 2 years of LDC experience across cohorts and school levels. As shown in Table 7.3, the resulting LDC sample included 26 schools, 88 teachers, and 4,331 students prior to the CEM process. It should be noted that two of the LDC schools spanned across both elementary and secondary grades. After the CEM student-level matching, our final secondary LDC sample was reduced to 3,979 students.

Prior to matching, the potential comparison sample consisted of 660 schools, 5,885 teachers, and 147,332 students. This comparison sample was substantially reduced during the first stage of matching, which identified up to five schools that closely resembled each of the LDC schools. After student-level CEM, a workable analytic comparison sample of 111 schools, 1,015 teachers, and 3,979 students was constructed.

Table 7.3

Before and After Matching Sample Sizes: Cohorts 1 and 2 Elementary and Middle School Analysis for Teachers With 2 Years of LDC Implementation

	LDC sample			Comparison sample		
	Schools	Teachers	Students	Schools	Teachers	Students
Stage 1						
Before school matching	26	88	4,331	660	5,885	147,332
After school matching	26	88	4,331	115	1,476	37,253
Stage 2						
After student matching	26	88	3,979	111	1,015	3,979

Cohort 1 Middle School Sample for Teachers With 3 Years of LDC Implementation

As shown in Table 7.4, the resulting Cohort 1 LDC middle school sample included three schools, eight teachers, and 831 students prior to the CEM process. After the CEM student-level matching, our final secondary LDC sample was reduced to 801 students.

Prior to matching, the potential comparison sample consisted of 115 schools, 2,663 teachers, and 74,727 students. This comparison sample was substantially reduced during the first stage of matching, which identified up to five schools that closely resembled each of the LDC schools. After student-level CEM, a workable analytic comparison sample of 14 schools, 247 teachers, and 801 students was constructed.

Table 7.4

Before and After Matching Sample Sizes: Cohort 1 Middle School Analysis for Teachers With 3 Years of LDC Implementation

	LDC sample			Comparison sample		
	Schools	Teachers	Students	Schools	Teachers	Students
Stage 1						
Before school matching	3	8	831	115	2,663	74,727
After school matching	3	8	831	14	394	10,390
Stage 2						
After student matching	3	8	801	14	247	801

7.2 Primary Outcome Analysis: Descriptive Results on the Matched Analytic Samples

Tables 7.5 through 7.8 present the characteristics of the LDC students and comparison students in the four sets of primary analyses respectively (descriptive results for matched samples for the supplementary analyses can be found in Tables I3 through I6 in Appendix I). Treatment and comparison samples matched very closely. Exact matching was achieved on some variables, and all demographic variables were within five percentage points. We used the spring 2019 Smarter Balanced ELA tests as our outcome measures in all analyses except when we combined Cohorts 1 and 2 schools; for those pooled analyses, spring 2018 test scores were used as the outcome measures for Cohort 1 students. Additionally, the Cohort 1 analyses used the spring 2016 Smarter Balanced ELA tests as one of the matching variables while the Cohort 2 analyses used the spring 2017 Smarter Balanced ELA tests.

For the baseline and outcome achievement variable, we standardized Smarter Balanced scale scores at each grade level relative to district performance, based on the district mean and standard deviation for the ELA test at each grade level. Standardizing scores in this way enables us to easily compare our sample's performance relative to the district's and to compare scores across grades and years more easily. A standardized scale score of zero, for example, indicates that the student scored at the mean for all other students in the district who took the same test. A standardized scale score of 1.0 meant that the student scored one standard deviation higher than the district mean. Conversely, a standardized scale score of -1.0 indicated that the student scored one standard deviation lower than the district mean.

The pooled LDC elementary school student sample after matching was composed mainly of Hispanic students eligible for free or reduced-price lunch (see Table 7.5). English language learners represented 15% of this sample, while special education students and those classified as gifted represented 6.3% and 12.7% respectively. The sample was also mostly composed of

students in third grade (86.0%) in the baseline year (and therefore in fifth grade in the outcome year), with the remainder being students in fourth grade at baseline and sixth grade in the outcome year (some elementary schools in the study had a K–6 grade range). Mean performance on the baseline year assessments was about one eighth of a standard deviation above the districtwide performance levels in both mathematics and ELA.

Table 7.5

Baseline Characteristics of the Pooled Group of Treated Students Taught by Cohort 1 and 2 Elementary School Teachers Participating in LDC in 2 Consecutive Years and Comparison Students After Matching

Student characteristic	Treatment group (*n* = 685)	Comparison group (*n* = 685)
Race/ethnicity		
Hispanic (%)	72.6	72.6
Black (%)	11.4	11.4
Asian (%)	4.4	4.4
White (%)	10.4	10.2
Other (%)	1.2	1.4
Female (%)	49.8	48.3
Special programs status		
Free or reduced-price lunch (%)	59.4	59.4
English language learner (%)	15.0	15.0
Special education (%)	6.3	6.3
Gifted (%)	12.7	8.9
Student baseline achievement		
Mean baseline year mathematics Z score	0.134	0.145
Mean baseline year ELA Z score	0.143	0.153
Class and teacher characteristics		
Mean baseline ELA Z score of current peers	0.126	0.091
Teacher years of experience	10.5	14.7
Grade level at baseline year		
Grade 3 (%)	86.0	86.0
Grade 4 (%)	14.0	14.0

The pooled LDC middle student sample (see Table 7.6) was almost entirely Hispanic and

more than two thirds of students were eligible for free or reduced-priced lunch. English language learners represented one fifth of this sample, while special education students and those classified as gifted each represented about 10% of the sample. The sample was mostly composed of students in fifth and sixth grades (87.5% combined) in the baseline year. In addition, mean performance on the baseline year assessments was slightly lower for LDC students as compared to districtwide performance levels in mathematics and ELA.

Table 7.6

Baseline Characteristics of the Pooled Group of Treated Students Taught by Cohort 1 and 2 Middle School Teachers Participating in LDC in 2 Consecutive Years and Comparison Students After Matching

Student characteristic	Treatment group (*n* = 3,294)	Comparison group (*n* = 3,294)
Race/ethnicity		
Hispanic (%)	94.7	94.7
Black (%)	2.7	2.7
Asian (%)	0.7	0.6
White (%)	1.4	1.3
Other (%)	0.5	0.7
Female (%)	50.9	50.9
Special programs status		
Free or reduced-price lunch (%)	71.6	70.9
English language learner (%)	19.2	19.2
Special education (%)	7.7	8.4
Gifted (%)	12.0	13.8
Student baseline achievement		
Mean baseline year mathematics Z score	-0.051	-0.050
Mean baseline year ELA Z score	-0.092	-0.099
Class and teacher characteristics		
Mean baseline ELA Z score of current peers	-0.101	-0.098
Teacher years of experience	15.4	13.3
Grade level at baseline year		
Grade 4 (%)	12.5	12.5
Grade 5 (%)	47.1	47.1
Grade 6 (%)	40.4	40.4

Table 7.7 reports the sample information for the students taught by the final pooled LDC sample across both cohorts and school levels. As can be seen, this sample included a very large proportion of Hispanic students (90.9%), and a majority of students who were eligible for free or reduced-price lunches (69.5%). English language learners represented slightly more than one fifth of this sample, while there were 12.1% special education students. The sample was mostly composed of students who were in fifth grade (39.0%) or sixth grade (33.4%) during the baseline. In addition, mean performance on the baseline year assessment was slightly lower for LDC students as compared to districtwide performance levels in mathematics and ELA.

Table 7.7

Baseline Characteristics of the Pooled Group of Treated Students Taught by Cohort 1 and 2 Elementary and Middle School Teachers Participating in LDC in 2 Consecutive Years and Comparison Students After Matching

Student characteristic	Treatment group (*n* = 3,979*)*	Comparison group (*n* = 3,979)
Race/ethnicity		
Hispanic (%)	90.9	90.9
Black (%)	4.2	4.2
Asian (%)	1.4	1.3
White (%)	2.9	2.9
Other (%)	0.6	0.7
Female (%)	50.7	50.5
Special programs status		
Free or reduced-price lunch (%)	69.5	69.0
English language learner (%)	18.5	18.5
Special education (%)	7.5	8.1
Gifted (%)	12.1	13.0
Student baseline achievement		
Mean baseline year mathematics Z score	-0.019	-0.017
Mean baseline year ELA Z score	-0.051	-0.055
Class and teacher characteristics		
Mean baseline ELA Z score of current peers	-0.062	-0.065
Teacher years of experience	14.6	13.5
Grade level at baseline year		
Grade 3 (%)	14.8	14.8
Grade 4 (%)	12.8	12.8
Grade 5 (%)	39.0	39.0
Grade 6 (%)	33.4	33.4

Table 7.8 reports the sample information for the students taught by Cohort 1 middle school teachers with 3 years of LDC. This sample consisted almost entirely of Hispanic students (96.5%) and students who were eligible for free or reduced-price lunches (95.4%). English language learners represented slightly more than one third of this sample, while 7.5% were

special education students and 10.1% were gifted students. The sample was mostly composed of students that were in fourth grade (59.2%) or fifth grade (39.6%) in the baseline year. In addition, mean performance on the baseline year assessments was about one quarter of a standard deviation lower for LDC students as compared to districtwide performance levels in mathematics and ELA.

Table 7.8

2015–2016 Baseline Characteristics of Treated Students Taught by Cohort 1 Middle School Teachers Participating in LDC in 3 Consecutive Years and Comparison Students After Matching

Student characteristic	Treatment group (*n* = 801)	Comparison group (*n* = 801)
Race/ethnicity		
Hispanic (%)	96.5	96.5
Black (%)	3.0	1.5
Asian (%)	0.0	0.1
White (%)	0.0	0.2
Other (%)	0.5	1.7
Female (%)		
Special programs status		
Free or reduced-price lunch (%)	95.4	95.4
English language learner (%)	36.7	36.7
Special education (%)	7.5	7.5
Gifted (%)	10.1	7.9
Student baseline achievement		
Mean baseline year mathematics Z score	-0.202	-0.250
Mean baseline year ELA Z score	-0.257	-0.248
Class and teacher characteristics		
Mean baseline ELA Z score of current peers	-0.269	-0.222
Teacher years of experience (<=3 years)	24.9	15.4
Grade level at baseline year		
Grade 3 (%)	1.2	1.2
Grade 4 (%)	59.2	59.2
Grade 5 (%)	39.6	39.6

7.3 Primary Outcome Analysis Results: Teachers Participating in LDC for 2 Consecutive Years Across Cohorts

Here, we examine the impact of LDC as practiced by teachers with 2 consecutive years of experience with the program. We first present the results for the elementary and middle schools separately, after which we present the results of an analysis pooling the two groups of schools together. In the analytic sample, students were typically exposed to only one teacher at the elementary level. As discussed in detail in Chapter 2, when elementary students were exposed to more than one teacher, their exposure was weighted with a sum of 1.0. In contrast, middle school students could be exposed to between zero and six different LDC teachers in a given year. Using an MMMC design, each observation at Level 1 represented one student. Weights across teachers for each student summed to a unity (1).

Two different approaches were used to model the LDC treatment intervention variable as a fixed effect at the student level. The first model was dosage dependent, and took into account variation in students' level of exposure to LDC teachers. In this approach, the treatment variable was structured as a continuous response variable between zero and one, based on exposure to LDC teachers. In contrast, the second approach was modeled as dosage independent, and considered any student exposed to any LDC intervention teacher to be a treated individual. In this latter approach the treatment variable was dichotomous, coded as one for LDC treated students and zero for comparison students.

In Tables 7.9 and 7.10 we present results of both the dosage-dependent and dosage-independent models, estimating the impact of LDC on Cohort 1 and Cohort 2 students in elementary and middle schools respectively. As can be seen, model results for the LDC effect on elementary student outcomes are in the positive direction, but are not statistically significant for either model. In other words, neither analysis provided sufficient evidence to conclude that elementary students taught by LDC teachers performed better on the ELA test than did their matched peers in the comparison group. As the analysis focused only on students in grades 5 and 6 in the outcome year, it is not generalizable to the full population of elementary school teachers implementing LDC.

The significant effects of the covariates on student performance were similar under the two models and were in the expected directions. Baseline ELA performance was the strongest predictor and baseline mathematics performance also helped explain the outcome. In addition to baseline achievement, three student-level demographic variables helped predict performance: English language learners performed at lower levels than English only and reclassified fluent English proficient students, females performed at significantly higher levels than males, and Black students performed at lower levels than did White students.

Table 7.9

Effect Estimates of Cohorts 1 and 2 Elementary School Teachers Participating in LDC in 2 Consecutive Years on Smarter Balanced ELA Performance, Dosage-Dependent and Dosage-Independent Models

Variable	Dosage-dependent model coefficient (*SD*)	Dosage-independent model coefficient (*SD*)
Level 2 LDC teacher treatment	0.028 (0.078)	0.021 (0.078)
Level 1 student characteristics		
Hispanic	-0.095 (0.057)	-0.095 (0.057)
Black	-0.236 (0.081)*	-0.236 (0.081)*
Free or reduced-price lunch	-0.020 (0.036)	-0.020 (0.036)
Female	0.118 (0.032)*	0.118 (0.032)*
English language learner	-0.106 (0.051)*	-0.106 (0.051)*
Special education	-0.025 (0.068)	-0.025 (0.068)
Gifted	0.025 (0.057)	0.025 (0.057)
Teacher experience	-0.166 (0.075)*	-0.166 (0.075)*
Baseline peer ELA Z score	0.154 (0.053)*	0.154 (0.053)*
Baseline year mathematics Z score	0.265 (0.030)*	0.265 (0.030)*
Baseline year ELA Z score	0.542 (0.029)*	0.542 (0.029)*
Grade 3 at baseline	-0.103 (0.083)	-0.103 (0.083)
Cohort 2 schools	-0.106 (0.121)	-0.106 (0.121)

Note. Based on the dosage-dependent model, the average treated student received a 0.997 treatment dosage. Because of this, using the dosage-dependent model we could estimate the ATET at (0.997 × 0.028) = 0.028.

*CI two-tailed probability ≥ .95

As presented in Table 7.10, dosage-dependent model results indicate a statistically significant and positive LDC effect on the ELA scores of the pooled sample of Cohort 1 and Cohort 2 middle school students. In contrast, the dosage-independent model did not yield a statistically significant LDC effect (it bears noting that LDC's preferred model was dosage-dependent, cross-disciplinary teacher team treatments). The significant dosage-dependent effect suggests that increased student exposure to LDC teachers was connected to improved ELA test performance. More specifically, treatment students with exposure to LDC in all three subjects were estimated to perform 0.281 standard deviations above matched comparison students. The average treatment student, however, had a 43.3% exposure to LDC in core content classes, and is estimated to perform 0.122 standard deviations above matched comparison students, the average treatment effect on the treated (ATET).

Table 7.10

Effect Estimates of Cohorts 1 and 2 Middle School Teachers Participating in LDC in 2 Consecutive Years on Smarter Balanced ELA Performance, Dosage-Dependent and Dosage-Independent Models

Variable	Dosage-dependent model coefficient (*SD*)	Dosage-independent model coefficient (*SD*)
Level 2 LDC teacher treatment	0.281 (0.081) *	0.101 (0.054)
Level 1 student characteristics		
Hispanic	-0.201 (0.047) *	-0.202 (0.047)*
Black	-0.369 (0.064) *	-0.370 (0.064)*
Free or reduced-price lunch	-0.050 (0.017)*	-0.050 (0.017)*
Female	0.180 (0.014)*	0.180 (0.014)*
English language learner	-0.130 (0.022)*	-0.130 (0.022)*
Special education	0.036 (0.029)	0.034 (0.029)
Gifted	0.048 (0.024)*	0.047 (0.024)
Honors English	0.134 (0.035)*	0.133 (0.035)*
Teacher experience	-0.031 (0.058)	-0.031 (0.059)
Baseline peer ELA Z score	0.178 (0.037)*	0.179 (0.037)*
Baseline year mathematics Z score	0.200 (0.013)*	0.200 (0.013)*
Baseline year ELA Z score	0.533 (0.014)*	0.534 (0.014)*
Grade 4 at baseline	0.006 (0.041)	0.007 (0.041)
Grade 5 at baseline	-0.075 (0.024)*	-0.069 (0.024)*
Cohort 2 schools	0.018 (0.029)	0.014 (0.029)

Note. Based on the dosage-dependent model, the average treated student received a 0.433 treatment dosage. Because of this, using the dosage-dependent model we could estimate the ATET at (0.433 × 0.281) = 0.122.

**CI* two-tailed probability ≥ .95

The significant effects of the covariates on student performance were similar under the two models and were in the expected directions. Baseline ELA performance remained the strongest predictor and baseline mathematics performance also helped explain the outcome. In addition to baseline achievement, Hispanic students, Black students, students receiving free or reduced-price lunch, and English language learner status were all significant predictors of ELA performance and were in the expected directions. Students enrolled in honors English courses performed at higher levels than did their peers taking standard English courses. Students performed similarly in Cohort 1 and Cohort 2 schools.

Table 7.11 presents the results of models combining the two preceding samples of elementary and middle school students. As with the middle school model, the dosage-dependent model here indicates a statistically significant and positive LDC effect on the ELA scores of the combined sample of elementary and middle school students. The dosage-independent model coefficient was positive but not statistically significant. The significant dosage-dependent effect suggests that increased student exposure to LDC teachers was connected to improved ELA test performance. More specifically, treatment students with exposure to LDC were estimated to perform 0.124 standard deviations above matched comparison students. The average treatment student, however, had a 53.1% exposure to LDC in core content classes, and was estimated to perform 0.066 standard deviations above matched comparison students (the ATET effect).

The significant effects of the covariates on student performance were similar under the two models and were in the expected directions. Again, baseline ELA performance remained the strongest predictor and baseline mathematics performance also helped explain the outcome. In addition to baseline achievement, Hispanic students, students receiving free or reduced-price lunch, and English language learner status were all significant predictors of ELA performance and were in the expected directions. Students enrolled in honors English courses performed at higher levels than did their peers taking standard English courses, and female students performed significantly higher. Students performed similarly in Cohorts 1 and 2 schools.

Table 7.11

Effect Estimates of Cohorts 1 and 2 Elementary and Middle School Teachers Participating in LDC in 2 Consecutive Years on Smarter Balanced ELA Performance, Dosage-Dependent and Dosage-Independent Models

Variable	Dosage-dependent model coefficient (SD)	Dosage-independent model coefficient (SD)
Level 2 LDC teacher treatment	0.124 (0.054)*	0.062 (0.046)
Level 1 student characteristics		
Hispanic	-0.154 (0.035)*	-0.153 (0.036)*
Black	-0.298 (0.048)	-0.297 (0.048)
Free or reduced-price lunch	-0.046 (0.015)*	-0.046 (0.015)*
Female	0.169 (0.013)*	0.169 (0.013)*
English language learner	-0.125 (0.020)*	-0.125 (0.020)*
Special education	0.026 (0.027)	0.026 (0.027)
Gifted	0.044 (0.022)*	0.045 (0.022)*
Honors English	0.134 (0.030)*	0.132 (0.030)*
Teacher experience	-0.078 (0.046)	-0.079 (0.046)
Baseline peer ELA Z score	0.170 (0.030)*	0.172 (0.030)*
Baseline year mathematics Z score	0.211 (0.012)*	0.210 (0.012)*
Baseline year ELA Z score	0.533 (0.012)*	0.533 (0.012)*
Grade 3 baseline	-0.011 (0.047)	0.002 (0.046)
Grade 4 baseline	0.026 (0.037)	0.028 (0.038)
Grade 5 baseline	-0.069 (0.024)*	-0.066 (0.024)*
Cohort 2 schools	0.010 (0.028)*	0.010 (0.028)*

Note. Based on the dosage-dependent model, the average treated student received a 0.531 treatment dosage. Because of this, using the dosage-dependent model we could estimate the ATET at (0.531 × 0.124) = 0.066.

**CI* two-tailed probability ≥ .95

7.4 Primary Outcome Analysis Results: Cohort 1 Teachers Participating in LDC for 3 Consecutive Years

In this section, we examine the impact of LDC as practiced by middle school teachers with 3 consecutive years of experience with the program. As can be seen in Table 7.12, model results for the LDC effect on student outcomes were in the positive direction, but were not statistically significant for either model. In other words, neither analysis provided sufficient evidence to conclude that middle school students taught by LDC teachers performed better on the ELA test

than did their matched peers in the comparison group. However, the diminished sample size via attrition among the Cohort 1 teachers likely influenced the model's ability to detect an effect.

The significant effects of the covariates on student performance were similar under both models and were in the expected direction. Once again, baseline ELA performance was the strongest predictor and baseline mathematics performance also helped explain the outcome. In addition, students in honors English courses performed at higher levels than did their peers taking standard English courses, and female students performed significantly higher.

Table 7.12

Effect Estimates of Cohort 1 Middle School Teachers Participating in LDC in 3 Consecutive Years on Smarter Balanced ELA Performance, Dosage-Dependent and Dosage-Independent Models

Variable	Dosage-dependent model coefficient (*SD*)	Dosage-independent model coefficient (*SD*)
Level 2 LDC teacher treatment	0.148 (0.233)	0.123 (0.127)
Level 1 student characteristics		
Hispanic	-0.069 (0.144)	-0.069 (0.144)
Black	-0.001 (0.177)	-0.003 (0.177)
Free or reduced-price lunch	0.013 (0.076)	0.013 (0.076)
Female	0.234 (0.033)*	0.234 (0.033)*
English language learner	-0.077 (0.040)	-0.077 (0.040)
Special education	-0.124 (0.071)	-0.120 (0.071)
Gifted	0.081 (0.063)	0.081 (0.063)
Honors English	0.200 (0.082)*	0.197 (0.082)*
Teacher experience	0.070 (0.122)	0.050 (0.120)
Baseline peer ELA Z score	0.222 (0.083)*	0.225 (0.084)*
Baseline year mathematics Z score	0.218 (0.030)*	0.218 (0.030)*
Baseline year ELA Z score	0.509 (0.030)*	0.509 (0.030)*
Grade 3 at baseline	-0.185 (0.170)	-0.193 (0.171)
Grade 4 at baseline	0.076 (0.047)	0.075 (0.046)

Note. Based on the dosage-dependent model, the average treated student received a 0.318 treatment dosage. Because of this, using the dosage-dependent model we could estimate an ATET at (0.318 × 0.148) = 0.047.

**CI* two-tailed probability ≥ *.95*

7.5 Supplementary Outcome Analysis Results: Cohort 2 Teachers Participating in LDC for 2 Consecutive Years

In this section, we present results of both the dosage-dependent and dosage-independent models on Cohort 2 elementary and middle school students' ELA performance in 2018–2019 after being taught by teachers with 2 years of LDC experience, respectively. As can be seen in Table 7.13, model results for the LDC effect on elementary student outcomes are in the positive direction, but are not statistically significant for either model. In other words, neither analysis provided sufficient evidence to conclude that elementary students taught by LDC teachers performed better on the ELA test than did their matched peers in the comparison group.

Table 7.13

Effect Estimates of Cohort 2 Elementary School Teachers Participating in LDC in 2 Consecutive Years on 2018–2019 Smarter Balanced ELA Performance, Dosage-Dependent and Dosage-Independent Models

Variable	Dosage-dependent model coefficient (*SD*)	Dosage-independent model coefficient (*SD*)
Level 2 LDC teacher treatment	0.009 (0.087)	0.007 (0.078)
Level 1 student characteristics		
Hispanic	-0.105 (0.058)	-0.105 (0.058)
Black	-0.222 (0.085) *	-0.222 (0.085) *
Free or reduced-price lunch	-0.023 (0.036)	-0.023 (0.036)
Female	0.118 (0.033)*	0.118 (0.033)*
English language learner	-0.101 (0.052)	-0.101 (0.052)
Special education	-0.025 (0.068)	-0.025 (0.068)
Gifted	0.035 (0.059)	0.035 (0.059)
Teacher experience	-0.176 (0.076)*	-0.176 (0.076)*
Baseline peer ELA Z score	0.144 (0.054)*	0.144 (0.054)*
Baseline year mathematics Z score	0.262 (0.031)*	0.262 (0.031)*
Baseline year ELA Z score	0.543 (0.030)*	0.543 (0.030)*
Grade 3 at baseline	-0.110 (0.083)	-0.110 (0.083)

Note. Based on the dosage-dependent model, the average treated student received a 0.997 treatment dosage. Because of this, using the dosage-dependent model we could estimate an ATET at (0.997 × 0.009) = 0.009.
**CI* two-tailed probability ≥ *.95*

The significant effects of the covariates on student performance also were similar under the two models and were in the expected direction. Baseline ELA performance was the strongest predictor and baseline mathematics performance also helped explain the outcome. In

addition to baseline achievement, two demographic variables helped predict performance: females performed at significantly higher levels than males, and Black students performed at lower levels than did White students.

The results for the Cohort 2 middle school students taught by teachers with 2 years of LDC experience tell a different story (Table 7.14). Both the dosage-dependent and dosage-independent model results indicate a statistically significant and positive LDC effect on the middle school student outcome. The significant dosage-dependent effect suggests that increased student exposure to LDC teachers was connected to improved ELA test performance. More specifically, treatment students with exposure to LDC in all three subjects were estimated to perform 0.367 standard deviations above matched comparison students. The average treatment student, however, had a 41.2% exposure to LDC in core content classes, and was estimated to perform 0.139 standard deviations above matched comparison students (the ATET effect). Note that we reported the effect of Cohort 1 middle school teachers in their second year of implementation in our prior report (Wang et al., 2019); those results did not find a statistically significant impact. When both cohorts were combined, however, an impact was found (see Tables 7.10 and 7.11). As such, it appears that the Cohort 2 middle schools were the main driver of positive impact.

Table 7.14

Effect Estimates of Cohort 2 Middle School Teachers Participating in LDC in 2 Consecutive Years on 2018–2019 Smarter Balanced ELA Performance, Dosage-Dependent and Dosage-Independent Models

Variable	Dosage-dependent model coefficient (*SD*)	Dosage-independent model coefficient (*SD*)
Level 2 LDC teacher treatment	0.367 (0.104)*	0.131 (0.068)*
Level 1 student characteristics		
Hispanic	-0.203 (0.049)*	-0.204 (0.050) *
Black	-0.405 (0.071)*	-0.407 (0.071) *
Free or reduced-price lunch	-0.044 (0.018)*	-0.044 (0.018)*
Female	0.168 (0.017)*	0.168 (0.017)*
English language learner	-0.125 (0.028)*	-0.126 (0.028)*
Special education	0.001 (0.038)	0.000 (0.038)
Gifted	0.060 (0.028)*	0.060 (0.028)*
Honors English	0.116 (0.042)*	0.113 (0.043)*
Teacher experience	-0.001 (0.067)	0.004 (0.068)
Baseline peer ELA Z score	0.204 (0.044)*	0.205 (0.045)*
Baseline year mathematics Z score	0.190 (0.016)*	0.189 (0.016)*
Baseline year ELA Z score	0.543 (0.017)*	0.543 (0.017)*
In Grade 4 at baseline	0.024 (0.046)	0.027 (0.046)
In Grade 5 at baseline	-0.064 (0.028)*	-0.056 (0.028)*

Note. Based on the dosage-dependent model, the average treated student received a 0.412 treatment dosage. Because of this, using the dosage-dependent model we could estimate an ATET at (0.412 × 0.338) = 0.139.

**CI* two-tailed probability ≥ .95

The significant effects of the covariates on student performance were similar under the two models and were in the expected direction. Baseline ELA performance was the strongest predictor and baseline mathematics performance also helped explain the outcome. In addition to baseline achievement, a number of demographic characteristics helped predict the outcome. Hispanic students, Black students, students receiving free or reduced-price lunch, and English language learners performed at lower levels than their reference groups. In contrast, females, gifted students, and students enrolled in honors English courses performed at higher levels.

7.6 Supplementary Outcome Analysis Results: Prior Year and Outcome Year Exposure Subgroups

In this section, we present results exploring subgroups of teachers and students from the Cohorts 1 and 2 middle school sample. These analyses explore whether the positive results found for the overall Cohorts 1 and 2 middle school sample are being driven by subgroups of teachers and/or students.

First, we explore whether students with sustained exposure to LDC over time performed at relatively higher levels than students exposed to LDC for the first time in the primary outcome year. To answer this question, we constructed two mutually exclusive subgroups of students: students who were exposed to LDC in 2 consecutive years (2016–2017 and 2017–2018 for Cohort 1; 2017–2018 and 2018–2019 for Cohort 2), and students who were only exposed to LDC in the second year (2017–2018 for Cohort 1; 2018–2019 for Cohort 2). Matched control groups were selected for each subgroup of students. The full results of the model can be found in Table I7 in Appendix I. The model includes indicator variables for the two treatment groups and the matched control group for the students exposed to LDC in 2 consecutive years. The control group for the students exposed to LDC in just the outcome year was used as the reference group in the model.

Our primary substantive interest, however, is not in the coefficients as displayed in Table I7, but rather in two post hoc tests of the statistical difference between coefficients, displayed in Table 7.15. Using the MLwiN software,[4] we obtained the chi square value (1 degree of freedom) for a test of the difference between two coefficients. The first test examines the difference between the coefficient for the treatment group of students exposed to LDC in 2 consecutive years, and the coefficient for the control group selected specifically for these treatment students. That test shows a difference of 0.102. Although the difference is in the expected direction, with the treatment group coefficient higher than the control group coefficient, the difference (with a *p* value of .076) is not significant. The second test examines the difference between the two treatment groups: those students with 2 years of LDC exposure and those students with only exposure in the outcome year. Again, the difference is in the expected direction but not significant ($p = .097$).

[4] See http://www.bristol.ac.uk/cmm/software/mlwin/

Table 7.15

Subgroup Results Examining Exposure of Students to LDC Over Time

Difference test	Difference	X^2	*p* value
Difference between coefficient for students exposed to LDC for 2 consecutive years and coefficient for matched control student group	0.102	2.753	.076
Difference between coefficient for students exposed to LDC for 2 consecutive years and coefficient for students with exposure to LDC only in the outcome year	0.045	4.505	.097

As described earlier, our analysis of LDC as practiced by middle school teachers with 2 years of participation showed a positive impact in both the dosage-dependent and dosage-independent models. Next we explore whether the impact for students with greater exposure to LDC teachers is different from the impact for students with less exposure to LDC teachers. Again, we constructed two mutually exclusive treatment groups: a high-dosage group consisting of students who were exposed to LDC in half or more of their core content area class time, and a low-dosage group consisting of students who were exposed to LDC in less than half of their core content area class time. Like the model for which results are displayed in Table 7.15 and Table I7 in Appendix I, this analysis selected matched control groups for each of the two mutually exclusive treatment groups, and indicators for three of the four groups were included in the model. Full model results are displayed in Table I8 in Appendix I, and the difference tests of interest are displayed in Table 7.16 below.

Table 7.16

Subgroup Results Examining High and Low LDC Dosage in the Outcome Year

Difference test	Difference	X^2	*p* value
Difference between coefficient for students exposed to LDC in over half of their core content class time and coefficient for matched control student group	0.142*	5.138	.023
Difference between coefficient for students exposed to LDC in over half of their core content class time and coefficient for students exposed to LDC in less than half of their core content class time	0.099*	4.505	.034

*$p < .05$.

As can be seen the coefficient for the high-dosage treatment group is larger than the coefficients for both the high-dosage matched control group and the low-dosage treatment group, and these differences (0.142 and 0.099 respectively) are statistically significant. These results suggest that the overall positive impact of LDC as practiced by middle school teachers in

their second consecutive year of implementation is mainly driven by the performance of students exposed to LDC teachers in greater than half of their core content class time.

7.7 Summary and Interpretation of Results

Here we summarize the student outcome analysis results. Table 7.17 includes the results of all of our analyses of the LDC impact as practiced by teachers with 2 or more years of LDC experience, including both analyses conducted this year and last year. In our previous report (Wang et al., 2019), we shared results of the impact of Cohort 1 middle school teachers with 2 years of LDC participation. In this report, we share for the first time the results of the impact of Cohort 2 teachers alone and the pooled group of Cohort 1 and Cohort 2 teachers. We also share the results of an analysis looking at the impact of Cohort 1 middle school teachers with 3 consecutive years of LDC experience.

Table 7.17

Impact of LDC on State ELA Assessment Scores by Cohort and School Level

Cohort/teachers	LDC Analytical Sample Information	Dosage-dependent model coefficient (*SD*)	Dosage-independent model coefficient (*SD*)
Cohort 1 elementary schools/teachers with 2 years of LDC	2 schools / 3 teachers / 45 students	Not conducted	Not conducted
Cohort 1 middle schools/teachers with 2 years of LDC[a]	4 schools / 22 teachers / 995 students	0.118 (0.116)	0.050 (0.083)
Cohort 2 elementary schools/teachers with 2 years of LDC	15 schools / 31 teachers / 640 students	0.009 (0.087)	0.007 (0.078)
Cohort 2 middle schools/teachers with 2 years of LDC	7 schools / 32 teachers / 2,299 students	**0.367 (0.104)***	**0.131 (0.068)***
Cohorts 1 and 2 elementary schools/teachers with 2 years of LDC	17 schools / 34 teachers / 685 students	0.028 (0.078)	0.021 (0.078)
Cohorts 1 and 2 middle schools/teachers with 2 years of LDC	11 schools / 54 teachers / 3,294 students	**0.281 (0.081)***	0.101 (0.054)
Cohorts 1 and 2 elementary and middle schools/teachers with 2 years of LDC	26 schools / 88 teachers / 3,979 students	**0.124 (0.054)***	0.062 (0.046)
Cohort 1 middle schools/teachers with 3 years of LDC	3 schools / 8 teachers / 801 students	0.148 (0.233)	0.123 (0.127)

[a]Full results can be found in our earlier report: Wang et al., 2019.
*Significant at $p \leq .05$.

We found statistically significant positive effects of Cohort 2 middle school teachers with 2 years of LDC implementation using both the dosage-dependent and dosage-independent treatment models. Cohort 2 middle school teachers and students formed the greatest part of our pooled samples, and as a result, the dosage-dependent positive effect also carried over to our analyses testing the impact of LDC as practiced for 2 consecutive years by all middle school teachers (Cohorts 1 and 2), and by all elementary and middle school teachers (again including Cohorts 1 and 2). These effects were not detected using the dosage-independent version of the treatment variable. An impact at the elementary level alone was not found, although it is important to note that the teacher and student samples for the elementary analyses were considerably smaller than for the middle school analysis, and the analyses only account for elementary teachers and students at grades 5 and 6 in the outcome year. Our analysis of the impact of Cohort 1 middle school teachers after 3 years of participation also did not show a statistically significant impact, although the coefficient was positive. As noted in Chapter 2, there was substantial attrition in Cohort 1. The sample of teachers who began implementing in 2016–2017 and continued through 2018–2019 was limited to eight teachers and 801 students, which was not large enough to detect an impact based on our earlier power analysis.

Next we provide a lens through which the reader can contextualize the magnitude of the results. We present dosage-dependent effects for each of the three primary analyses based on teachers with 2 years of LDC implementation. Figure 7.1 depicts the estimated impacts of LDC in the three samples of students exposed to LDC teachers in all three major content areas: ELA, social studies/history, and science. These effect sizes can be best understood as the estimated impact of LDC under ideal conditions. Figure 7.2 depicts the estimated impact of LDC in the three samples on the average observed student, who in the middle school context had considerably less exposure to LDC teachers in his or her core content classes.

Figure 7.1

Treatment Effect on Smarter Balanced ELA Scores With 95% Credibility Interval for Students With Full LDC Dosage, by Cohort

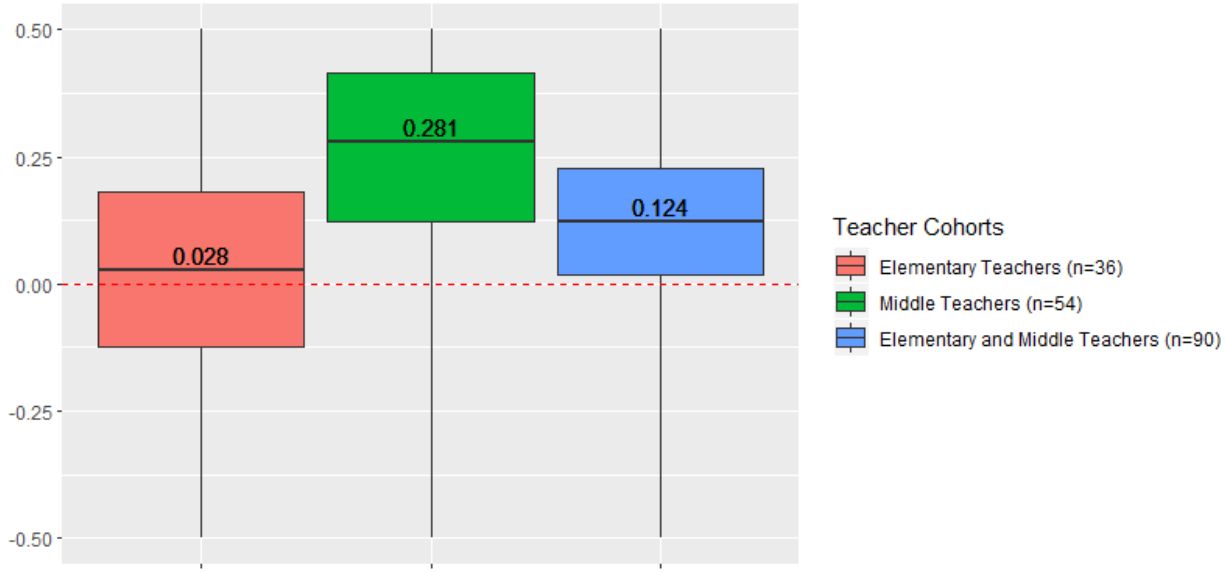
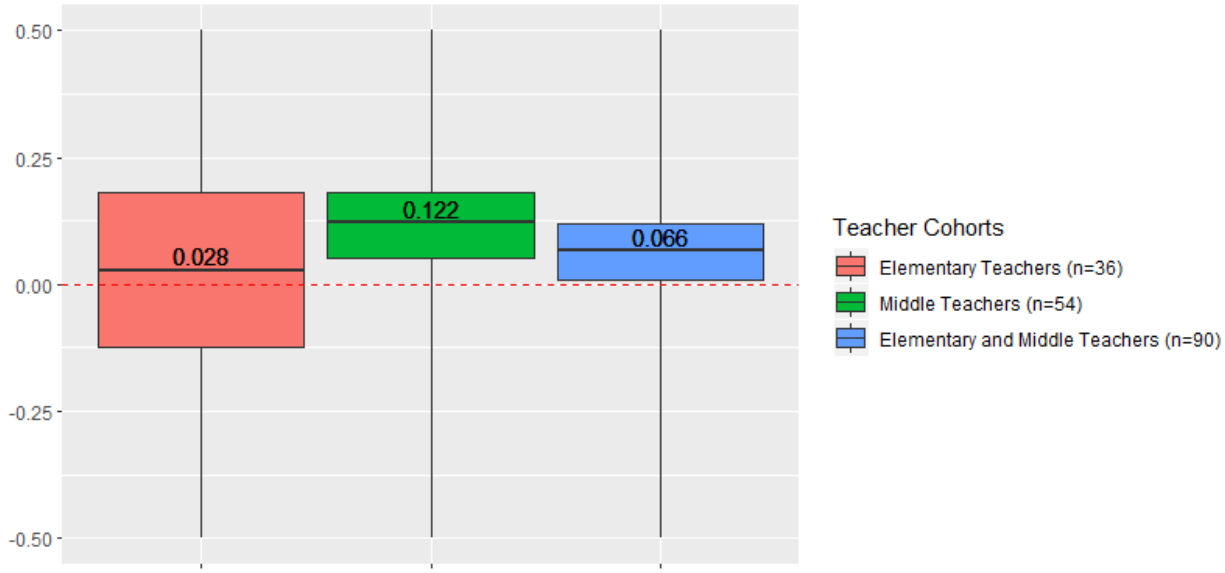


Figure 7.2

Treatment Effect on Smarter Balanced ELA Scores With 95% Credibility Interval for Students With Average LDC Dosage, by Cohort



The figures make clear that middle school teachers were the primary driver behind the significant positive effects. Both the elementary and middle school coefficients were in the positive direction, but the magnitude of the middle school coefficient was about 10 times larger when looking at the impact of full LDC dosage. As a result, the lower bound of the credibility interval for the middle school coefficient is well above the zero line, whereas the lower bound of the credibility interval for the elementary school coefficient is substantially below the zero line. When the two samples are combined for one analysis, the lower bound of the credibility interval is just above the zero line. Thus, evidence of differential impacts across school levels is strong, with a clear impact at the middle school level and no evidence of an impact at the elementary school level. It is important again to note that elementary analyses relied on a smaller teacher and student sample than the middle school analyses, and only included teachers and students in Grades 5 and 6 in the outcome year.

To help the reader contextualize the statistically significant effect for middle school teachers, we utilize an approach developed by Hill et al. (2008), which involves benchmarking against average student gains over the course of a school year. The authors reviewed annual achievement gains in seven nationally normed reading assessments: CAT5, SAT9, Terra Nova-CTBS, Gates-MacGinitie, MAT8, Terra Nova-CAT, and SAT10. They found that students gained an average of .32 standard deviations from Grades 5 to 6, .23 standard deviations from Grades 6 to 7, and .26 standard deviations from Grades 7 to 8. A simple mean of these three average gains is .27.

Using this benchmark, and assuming a 9-month school year, the .122 effect estimate for students with average observed LDC dosage is of similar magnitude to **4.1 months of learning** in the Hill et al. (2008) meta-analysis [(.122/.27)*9=4.1]. Likewise, the .281 effect estimate for students with full LDC dosage aligns to approximately **9.4 months of schooling** [(.281/.27)*9=9.4]. It is important to note again that the ideal conditions of students being exposed to LDC in all three core content areas across the whole school year was not met for most students; therefore the extrapolation of 4.1 months is the figure best aligned with the actual observed effect of LDC.

8.0 Summary of Findings

This final annual report examines LDC following 3 years of implementation in Cohort 1 schools and 2 years of implementation in Cohort 2 schools. We summarize these results organized by the three categories of evaluation questions listed in Chapter 1 of this report.

8.1 Program Characteristics and Implementation

The study schools serve largely Hispanic populations, with a high proportion of students qualifying for free or reduced-price lunch, and many English language learners. Consistent with prior year results, participants reported overwhelmingly positive attitudes toward LDC and its implementation at their schools. Teachers generally appreciated the opportunity to collaborate with colleagues, and nearly uniformly praised their LDC coaches.

Evidence suggests that implementation was largely faithful to the intended structure of LDC, although the level of implementation was not uniformly high. The frequency of PLC meetings varied greatly across schools, with some PLCs struggling to meet frequently and ensure high attendance. On a positive note, PLC members were nearly uniform in reporting that their teacher leaders were supportive, knowledgeable, and helpful. Teacher leaders themselves also reported high satisfaction with support from coaches, professional development offerings, and how the teacher leader role allowed them to be instructional leaders in their schools.

Analysis of program data suggests that nearly all participants were engaging with the module building platform at least to some degree, but that engagement varied considerably. About half of teachers failed to engage in module design at a basic level by editing the teaching task, while others engaged deeply by editing multiple module elements. When coaches provided feedback via commenting on modules and other methods, PLC members generally found it useful. But our fidelity analysis revealed that 40% of modules did not receive the program goal of two coach comments. Furthermore, the national peer review process was used by few participants. Module analysis suggests that the materials adapted and created by PLC members varied in levels of completion, and based on the presence of uploaded student work, a sizable number of modules might not have been implemented in the classroom.

8.2 Contextual Factors and Implementation

Coaches and teacher leaders were almost universally praised by teachers participating in LDC. While teacher respondents generally reported that their school administrators were supportive of the program, administrators' level of participation in PLC meetings and their observation of LDC instruction varied greatly across the sample. There was substantial attrition of schools and teachers from the program across the 3 years, with many school leaders deciding that they didn't have sufficient resources and/or teacher buy-in to sustain the program. Most schools that remained in the program at the end of the study, however, indicated that they would continue to use LDC practices and tools, at least to some extent.

While school personnel generally perceived district leaders as supportive of LDC, some educators didn't feel district leaders fully understood the program.

8.3 Program Impacts

Based on survey results, LDC was perceived to have positive impacts on a range of both teacher practices and student skills. Teachers, in general, felt that LDC had improved their instructional planning and pedagogical skill sets and was also helping to promote collaboration between teachers. Teachers and administrators also felt that LDC was improving student learning across multiple domains, in particular writing skills. Furthermore, those attitudes around teacher and student skills became even more positive over time on average for teachers completing the survey in both 2017−2018 and 2018−2019. Analysis of module quality showed improvement from 2016–2017 to 2017–2018, but average quality seemed to decrease slightly from 2017–2018 to 2018–2019.

Quasi-experimental analyses demonstrated a positive impact of LDC as implemented by middle school teachers with 2 years of LDC experience on student ELA scores. Results using a dosage-dependent treatment variable suggest that students who were exposed to a greater amount of LDC instruction (via multiple participating teachers in different content areas) benefited more from the program. An analysis breaking up treatment students into two groups based on the dosage of LDC instruction they received substantiated the finding that impact was greater for those students exposed to LDC in more classes. In contrast, a statistically significant impact was not found at the elementary school level, where students were typically exposed to just one LDC teacher, and one to two LDC modules.

8.4 Overall Conclusions

Our mixed methods evaluation of LDC provides impressive evidence of the effectiveness of LDC as a tool to engage teachers around improving literacy instruction and to improve student learning around reading and writing. At its core, LDC provides a structure for teachers to meet, share practices, and collaboratively learn about how to infuse reading and writing into their curriculum and implement instruction that gives students opportunities to learn content and work on their reading and writing skills simultaneously.

This study provides ample evidence that teachers valued the opportunity to learn together, and appreciated the range of in-person and digital supports that LDC offered. The time commitment was substantial, and not all teachers, administrators, and schools were able to sustain that commitment in the face of competing demands for attention and time. But those educators that remained in the program felt that it had a measurable impact on the skills of both teachers and students. That perception was confirmed at the middle school level by our rigorous quasi-experimental analyses, which show a substantial positive impact of LDC as practiced by middle school teachers with 2 years of LDC experience. Furthermore, middle

school students exposed to multiple LDC teachers across different content areas (ELA, social studies, and science) benefited more from the program than students with less exposure.

Ensuring administrator and teacher buy-in, and dedicating substantial resources to the program (common planning time in particular) would likely yield even more positive results. Investment in further improvements to the support and delivery model at the elementary school level may also widen LDC's impact.

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Appendix A:
Teacher Survey and Responses

2018–2019
LDC Teacher Survey

1 LDC Participation

T1. Please select your school from the drop down box.
Teachers are skipped to T3 if they teach in an elementary school.

T2a. In the current school year (2018-19), how many classes did you teach?

☐ classes n = 82, Mean = 4.78, Range: 1-7

T2b. In how many of these classes did you use LDC modules and/or mini-tasks?

☐ classes n = 82, Mean = 2.86, Range: 1-6

T2c. In what content areas did you use LDC modules and/or mini-tasks?

_____

T2d. In what grades did you use LDC modules and/or mini-tasks?

_____

T3. Prior to the current school year (2018-19), did you have any experience with LDC?

(n = 231)

☐ Yes — 151 teachers (65.4%)

☐ No — Skip to T5a — 80 teachers (34.6%)

T4. How many of the following did you teach prior to the current school year (2018-19)?

☐	LDC modules	n = 151, Mean = 2.19, Range: 0-10
☐	LDC mini-tasks, outside of modules	n = 151, Mean = 2.78, Range: 0-20

2 Professional Learning Community and Teacher Collaboration

T5a. Did you participate this year in a Professional Learning Community (PLC) at least partly focused on implementing LDC in your school?

(n = 199)

☐ Yes	Skip to T6	192 teachers (96.5%)
☐ No		7 teachers (3.5%)

T5b. Did you use any LDC tools in your instructional planning or classroom instruction this year?

(n = 7)

☐ Yes	Skip to 5d	6 teachers (85.7%)
☐ No		1 teacher (14.3%)

T5c. Why did you choose not to use any LDC tools in your instructional planning or classroom instruction this year?

[Survey ends here for respondents answering question T5c]

T5d. What LDC tools did you use during the current school year? Select all that apply.

	(n = 6)
☐ CoreTools online platform to access existing modules or mini-tasks	5 teachers (83.3%)
☐ CoreTools online platform to design modules or mini-tasks	5 teachers (83.3%)
☐ LDC online courses	3 teachers (50.0%)
☐ Modules or mini-tasks given to me by other teachers in my school	4 teachers (66.7%)
☐ Other (please specify) _____	0 teachers

[Survey ends here for respondents answering question T5d]

T6. About how often did your LDC PLC meet?

		(n = 224)
☐ Less than once a month		12 teachers (5.4%)
☐ Once a month		69 teachers (30.8%)
☐ Every other week		118 teachers (52.7%)
☐ Once a week	Skip to T8	21 teachers (9.4%)
☐ Twice a week or more often	Skip to T8	4 teachers (1.8%)

T7. What were the primary barriers preventing your LDC PLC from meeting weekly? Select all that apply.

	(n = 199)
☐ PLC time was not protected.	38 teachers (16.5%)
☐ PLC members had limited interest in attending meetings.	25 teachers (10.8%)
☐ School administrator did not make it a priority.	18 teachers (7.8%)
☐ Teacher Leader did not provide sufficient organizational support.	1 teacher (0.4%)
☐ Not enough teachers participated.	9 teachers (3.9%)
☐ PLC members had other priorities that compete with LDC participation.	99 teachers (42.9%)
☐ Other (please specify) _____	67 teachers (29.0%)

T8. About how often did you have informal discussions (as opposed to scheduled meetings) about LDC with teachers in your LDC PLC?

	(n = 224)
☐ Less than once a month	20 teachers (8.9%)
☐ Once a month	51 teachers (22.8%)
☐ Every other week	62 teachers (27.7%)
☐ Once a week	75 teachers (33.5%)
☐ Twice a week or more	16 teachers (7.1%)

T9. On average, how long did your school's LDC PLC meetings typically last?

	(n = 224)
☐ Less than 45 minutes	12 teachers (5.4%)
☐ 45 to 59 minutes	148 teachers (66.1%)
☐ 60 to 74 minutes	59 teachers (26.3%)
☐ 75 minutes or more	5 teachers (2.2%)

3 Teacher Training and Support

T10. How effective was your LDC PLC in the following areas?

	Not effective	A little effective	Moderately effective	Very effective
Creating an environment in which teachers were comfortable working together (n = 224)	3 (1.3%)	16 (7.1%)	80 (35.7%)	125 (55.8%)
Fostering an environment where teachers shared their instructional plans with colleagues (n = 224)	3 (1.3%)	17 (7.6%)	83 (37.1%)	121 (54.0%)
Allowing space to share student work (n = 224)	3 (1.3%)	23 (10.3%)	91 (40.6%)	107 (47.8%)
Helping teachers to improve their LDC instructional plans. (n = 224)	2 (0.9%)	23 (10.3%)	92 (41.1%)	107 (47.8%)

T11. How would you rate each of the following aspects of the online course material (in the Learn tab in LDC CoreTools) that your coach used or directed you to use?

	Poor	Fair	Good	Excellent
Clarity of information presented (n = 224)	6 (2.7%)	33 (14.7%)	110 (49.1%)	75 (33.5%)
Relevance of information presented (n = 224)	4 (1.8%)	28 (12.5%)	110 (49.1%)	82 (36.6%)
Ease of use (n =224)	17 (7.6%)	52 (23.2%)	97 (43.3%)	58 (25.9%)
Usefulness of resource documents (e.g., LDC Pitfall Checklist, CCSS Mental Markers, etc.) (n = 224)	9 (4.0%)	32 (14.3%)	107 (47.8%)	76 (33.9%)
Usefulness of videos (n = 224)	13 (5.8%)	58 (25.9%)	106 (47.3%)	47 (21.0%)
Degree to which course material helped teachers to create and/or adapt LDC modules (n = 224)	7 (3.1%)	38 (17.0%)	110 (49.1%)	69 (30.8%)
Opportunity to extend learning when needed or desired (n = 224)	5 (2.2%)	39 (17.4%)	104 (46.4%)	76 (33.9%)

T12a. Overall, were you able to get the feedback and support you needed from your LDC coach (through written feedback in LDC CoreTools, or coaching and modeling in your LDC PLCs) to plan, teach, reflect on, and revise LDC modules)?

(n = 224)

☐ Yes 216 teachers (96.4%)

☐ No 8 teachers (3.6%)

T12b. Did your LDC coach provide written feedback on your module(s) in LDC CoreTools in a timely manner?

(n = 224)

☐ Yes 211 teachers (94.2%)

☐ No 13 teachers (5.8%)

T13. Outside of the PLC meetings with your LDC coach, please indicate whether you used each of the following types of coach support, and how helpful you found these types of support.

	Did not use	Used			
		Not helpful	A little helpful	Moderately helpful	Very helpful
Written feedback in LDC CoreTools from your LDC coach (in the comments areas and/or via the teacher work rubric) (n = 224)	31 (13.8%)	6 (2.7%)	33 (14.7%)	69 (30.8%)	85 (37.9%)
One-on-one Zoom video conference and/or call with your LDC coach (n = 224)	45 (20.1%)	8 (3.6%)	25 (11.2%)	43 (19.2%)	103 (46.0%)
Email or phone communication with your LDC coach (n = 224)	58 (25.9%)	4 (1.8%)	31 (13.8%)	60 (26.8%)	71 (31.7%)
Other (n = 224) Please specify:_____	162 (72.3%)	3 (1.3%)	5 (2.2%)	18 (8.0%)	36 (16.1%)

4 Module Creation

T14. During the current school year (2018-19), how many LDC modules did you individually or collaboratively adapt from existing modules (e.g., modules you created in a prior year and/or modules found in the LDC Library in CoreTools)?

☐ Adapted modules n = 192, Mean = 1.83, Range: 0-11

T15. During the current school year (2018-19), how many LDC modules did you create, either individually or with colleague(s)? Only include modules built from scratch, not those adapted from existing modules in the LDC library.

☐ New modules n = 192, Mean = 0.91, Range: 0-5

T16. How did members of your PLC collaborate to create LDC modules? Check all that apply.

(n = 231)

- ☐ Modules were created by individual teachers. — 75 teachers (32.5%)
- ☐ Modules were created by teams of two or more teachers. — 143 teachers (61.9%)
- ☐ Modules were created by the PLC as a whole. — 49 teachers (21.2%)
- ☐ Other (please specify) _____ — 21 teachers (9.1%)

T17. Please indicate to what extent you were able to do each of the following when creating LDC modules.

	Not at all	A little bit	A moderate extent	A great extent
Select focus standards for a writing assignment (n = 224)	3 (1.3%)	12 (5.4%)	71 (31.7%)	138 (61.6%)
Create a standards-driven writing assignment (n = 224)	4 (1.8%)	14 (6.3%)	66 (29.5%)	140 (62.5%)
Select high quality, complex texts and other materials to engage students in deeper learning (n = 224)	3 (1.3%)	24 (10.7%)	99 (44.2%)	98 (43.8%)
Identify the skills students need to develop to complete a writing assignment (n =224)	3 (1.3%)	13 (5.8%)	82 (36.6%)	126 (56.3%)
Create daily lessons to teach the skills a student needs to complete a writing assignment (n = 224)	6 (2.7%)	32 (14.3%)	95 (42.4%)	91 (40.6%)
Differentiate instruction by incorporating multiple ways of thinking, various levels of complexity, and multiple modalities. (n = 224)	7 (3.1%)	40 (17.9%)	100 (44.6%)	77 (34.4%)
Plan for a variety of methods to assess student progress (e.g., rubrics and/or mini-task scoring guides) (n = 224)	7 (3.1%)	37 (16.5%)	98 (43.8%)	82 (36.6%)
Assess the quality of writing assignments and/or instructional plans using Peer Review/Curriculum Alignment Rubric (e.g. Task Pitfalls Checklist, rubric indicators) (n = 224)	6 (2.7%)	22 (9.8%)	95 (42.4%)	101 (45.1%)
Make a writing assignment relevant and engaging for students (n = 224)	3 (1.3%)	16 (7.1%)	93 (41.5%)	112 (50.0%)

5 Classroom Implementation

T18. How many total LDC modules did you teach during the current school year (2018-19)?

[ ] Modules n = 224, Mean = 2.16, Range: 0-6

T19. Outside of modules, approximately how many individual LDC mini-tasks did you teach during the current school year (2018-19)?

[ ] Mini-tasks n = 224, Mean = 3.33, Range: 0-20

T20. Please indicate to what extent you were able to do each of the following activities when teaching LDC modules.

	Not at all	A little bit	A moderate extent	A great extent
Engage students in understanding the assignment and its rubric (n = 224)	2 (0.9%)	15 (6.7%)	89 (39.7%)	118 (52.7%)
Engage students in accessing complex text for the purpose of the assignment (n =224)	3 (1.3%)	18 (8.0%)	95 (42.4%)	108 (48.2%)
Systematically collect information about students' progress (n = 224)	5 (2.2%)	23 (10.3%)	117 (52.2%)	79 (35.3%)
Provide feedback to students using assignment rubrics (n = 224)	4 (1.8%)	31 (13.8%)	87 (38.8%)	102 (45.5%)
Locate evidence of standards in final student work on the writing assignment (n = 224)	2 (0.9%)	22 (9.8%)	85 (37.9%)	115 (51.3%)
Use evidence of student progress on standards to modify subsequent instruction (n = 224)	7 (3.1%)	24 (10.7%)	94 (42.0%)	99 (44.2%)

T21. Toward the beginning of the school year, did you "find and teach" a module from CoreTools?

(n = 224)

- ☐ Yes — 144 teachers (64.3%)
- ☐ No — Skip to T24 — 80 teachers (35.7%)

T22. What was the name of the Find and Teach module?

_____

T23. Did you make any adjustments to the Find and Teach module?

(n = 144)

- ☐ Yes — 104 teachers (72.2%)
- ☐ No — 40 teachers (27.8%)

T24. What module did you adapt, refine, and/or develop most during the current school year (2018-19)? This module is typically one you worked on *after* the Find and Teach module.

_____

T25. Which of these statements best describes how you created the module named in the previous question?

(n = 224)

- ☐ I created a module from a template in CoreTools. — 69 teachers (30.8%)
- ☐ I found and adjusted another teacher's module from the LDC Library in CoreTools. — 155 teachers (69.2%)

T26. Did you teach this module in your classroom?

(n = 224)

- ☐ Yes, I have already taught this module this year. — 194 teachers (86.6%)
- ☐ No, but I plan to teach this module before the end of the 2017-18 school year. — 16 teachers (7.1%)
- ☐ No, but I plan to teach this module during next school year. — 9 teachers (4.0%)
- ☐ No. I do not currently have plans to teach this module in my classroom. — 5 teachers (2.2%)

6 Module Peer Review

T27. Did you attend a Peer Review/Curriculum Alignment Workshop this school year? (Y/N)

(n = 224)

- ☐ Yes — 77 teachers (34.4%)
- ☐ No — 147 teachers (65.6%)

T28. How many modules did you submit online for LDC National Peer Review during the current school year (2018-19)?

☐ Modules If none, skip to T30 n = 224, Mean = 0.58, Range: 0-3

T29. How helpful did you find the National Peer Review process in improving the quality of your module?

	(n = 83)
☐ Not helpful	7 teachers (8.4%)
☐ A little helpful	19 teachers (22.9%)
☐ Moderately helpful	38 teachers (45.8%)
☐ Very helpful	19 teachers (22.9%)

7 Impact on Teacher Practice and Learning

T30. Between the beginning and end of this year's work with LDC, please indicate how much your skills have *improved* in the following areas:

	Not at all	A little	Moderately	A great deal
Selecting focus standards for a writing assignment (n = 224)	3 (1.3%)	25 (11.2%)	99 (44.2%)	97 (43.3%)
Creating standards-driven writing assignments (n =2 24)	3 (1.3%)	30 (13.4%)	95 (42.4%)	96 (42.9%)
Identifying the skills students need to develop to complete a writing assignment (n = 224)	3 (1.3%)	27 (12.1%)	102 (45.5%)	92 (41.1%)
Creating daily lessons to teach the skills students need to complete a writing assignment (n = 224)	5 (2.2%)	32 (14.3%)	109 (48.7%)	78 (34.8%)
Systematically collecting information on students' progress. (n = 224)	7 (3.1%)	32 (14.3%)	114 (50.9%)	71 (31.7%)
Identifying patterns of student understandings or misconceptions (n = 224)	7 (3.1%)	40 (17.9%)	98 (43.8%)	79 (35.3%)
Using evidence of student progress on standards to modify subsequent instruction (n = 224)	5 (2.2%)	28 (12.5%)	112 (50.0%)	79 (35.3%)

T31. Please indicate the degree to which you agree or disagree with the statements below.

	Strongly disagree	Disagree	Agree	Strongly agree
Participating in LDC raised my expectations for students' writing. (n = 224)	3 (1.3%)	21 (9.4%)	117 (52.2%)	83 (37.1%)
Using LDC modules became an important part of my instructional practice. (n = 224)	4 (1.8%)	51 (22.8%)	115 (51.3%)	54 (24.1%)
Implementing LDC helped me incorporate my state's College- and Career-Ready Standards into my instruction. (n = 224)	4 (1.8%)	34 (15.2%)	130 (58.0%)	56 (25.0%)
LDC helped me incorporate writing assignments into my existing curriculum. (n = 224)	2 (0.9%)	25 (11.2%)	118 (52.7%)	79 (35.3%)
I am more likely to collaborate with other teachers on designing instruction after participating in our LDC Professional Learning Community. (n = 224)	6 (2.7%)	24 (10.7%)	137 (61.2%)	57 (25.4%)
LDC helped me improve on my teacher evaluation ratings. (n = 224)	8 (3.6%)	48 (21.4%)	118 (52.7%)	50 (22.3%)
Participating in LDC helped me develop working relationships with teachers in different grades and/or subjects. (n = 224)	7 (3.1%)	40 (17.9%)	111 (49.6%)	66 (29.5%)
I shared my LDC work with colleagues outside of the LDC PLC. (n = 224)	14 (6.3%)	77 (34.4%)	88 (39.3%)	45 (20.1%)

8 Impact on Student Learning

T32. Please indicate to what extent LDC had a positive effect on students in the following areas.

	Not at all	A little	Moderately	A great deal
Reading skills (n = 224)	7 (3.1%)	41 (18.3%)	113 (50.4%)	63 (28.1%)
Content knowledge (n = 224)	2 (0.9%)	34 (15.2%)	98 (43.8%)	90 (40.2%)
Ability to complete writing assignments (n = 224)	4 (1.8%)	30 (13.4%)	101 (45.1%)	89 (39.7%)
Quality of students' writing (n = 224)	3 (1.3%)	32 (14.3%)	103 (46.0%)	86 (38.4%)
College and career ready skills (n = 224)	7 (3.1%)	46 (20.5%)	98 (43.8%)	73 (32.6%)
Capacity to analyze and understand the components of a writing assignment (n = 224)	2 (0.9%)	37 (16.5%)	99 (44.2%)	86 (38.4%)
Speaking and listening skills (n = 224)	5 (2.2%)	49 (21.9%)	105 (46.9%)	65 (29.0%)
Overall literacy performance (n = 224)	3 (1.3%)	33 (14.7%)	116 (51.8%)	72 (32.1%)
Performance on assessments throughout the school year (n = 224)	5 (2.2%)	50 (22.3%)	101 (45.1%)	68 (30.4%)

9 Teacher Leader Support

The following question refers to the LDC project liaison in your school. This is the teacher leading your Professional Learning Community work.

T33. Please indicate the degree to which you agree or disagree with the following statements.

	Strongly disagree	Disagree	Agree	Strongly agree
Our school's LDC teacher leader effectively supported our Professional Learning Community meetings. (n = 192)	0 (0.0%)	5 (2.6%)	63 (32.8%)	124 (64.6%)
When I had questions about LDC, I felt comfortable approaching our school's teacher leader. (n = 192)	0 (0.0%)	6 (3.1%)	58 (30.2%)	128 (66.7%)
Our teacher leader helped teachers align LDC to broader school instructional goals. (n = 192)	0 (0.0%)	13 (6.8%)	67 (34.9%)	112 (58.3%)
Our teacher leader offered useful feedback for the design and revision of LDC modules. (n = 192)	0 (0.0%)	11 (5.7%)	69 (35.9%)	112 (58.3%)
Our teacher leader was effective in inviting teachers to join the LDC initiative. (n = 192)	0 (0.0%)	2 (1.0%)	75 (39.1%)	115 (59.9%)

10 School Administrator Support

The following questions refer to the school administrator who oversees the LDC project at your school.

T34. What proportion of PLC meetings focused on LDC did your school administrator attend?

	(n =224)
☐ Less than one quarter of LDC PLCs	45 teachers (20.1%)
☐ About one quarter of LDC PLCs	26 teachers (11.6%)
☐ About one half of LDC PLCs	50 teachers (22.3%)
☐ About three quarters of LDC PLCs	32 teachers (14.3%)
☐ More than three quarters of LDC PLCs	71 teachers (31.7%)

T35. How many times did your school administrator observe you teach an LDC mini-task during the current school year (2018-19)?

	(n = 224)
☐ 0 times	85 teachers (37.9%)
☐ 1 time	50 teachers (22.3%)
☐ 2 times	55 teachers (24.6%)
☐ 3 or more times	34 teachers (15.2%)

T36. Please indicate the degree to which you agree or disagree with the following statements.

My school administrator…	Strongly disagree	Disagree	Agree	Strongly agree
had a firm understanding of LDC. (n = 224)	12 (5.4%)	27 (12.1%)	126 (56.3%)	59 (26.3%)
allocated resources such as teacher time, payment, administrator time, support staff, sub coverage, etc., to ensure the LDC team could meet. (n = 224)	8 (3.6%)	23 (10.3%)	115 (51.3%)	78 (34.8%)
encouraged teachers to participate in LDC. (n = 224)	2 (0.9%)	15 (6.7%)	113 (50.4%)	94 (42.0%)
expressed concerns that implementing LDC is taking time away from other instructional priorities. (n = 224)	60 (26.8%)	79 (35.3%)	55 (24.6%)	30 (13.4%)
communicated how using LDC's tools supported specific school initiatives and/or goals. (n = 224)	10 (4.5%)	29 (12.9%)	128 (57.1%)	57 (25.4%)
provided me with feedback about my LDC planning and/or instruction. (n =224)	25 (11.2%)	57 (25.4%)	103 (46.0%)	39 (17.4%)
made formative assessment a priority at my school. (n = 224)	13 (5.8%)	39 (17.4%)	121 (54.0%)	51 (22.8%)
used LDC to implement standards-driven assignments within existing curriculum. (n = 224)	15 (6.7%)	32 (14.3%)	120 (53.6%)	57 (25.4%)

11 Teacher Leadership Role

T37. Please indicate the degree to which you agree or disagree with the following statements about your role in your school's LDC implementation.

	Strongly disagree	Disagree	Agree	Strongly agree
I was involved in setting instructional goals for the LDC work at my school. (n = 192)	10 (5.2%)	48 (25.0%)	95 (49.5%)	39 (20.3%)
I was involved in discussions about how to expand LDC implementation at my school in future years. (n = 192)	11 (5.7%)	70 (36.5%)	77 (40.1%)	34 (17.7%)
I had the opportunity to work with our LDC teacher leader and our administrator to help shape LDC implementation. (n = 192)	13 (6.8%)	55 (28.6%)	83 (43.2%)	41 (21.4%)
I am interested in learning more about how to lead LDC implementation at my school by facilitating with the virtual coach, providing feedback to my peers, etc. (n = 192)	21 (10.9%)	72 (37.5%)	72 (37.5%)	27 (14.1%)

12 Facilitators and Barriers

T38. Please indicate the degree to which you agree or disagree with the following statements.

	Strongly disagree	Disagree	Agree	Strongly agree
My LDC PLC was given sufficient time to meet. (n = 224)	9 (4.0%)	35 (15.6%)	128 (57.1%)	52 (23.2%)
I felt adequately prepared to effectively implement LDC modules in my classroom. (n = 224)	8 (3.6%)	26 (11.6%)	140 (62.5%)	50 (22.3%)
It was challenging to find content-rich reading materials for the LDC modules I developed. (n = 224)	14 (6.3%)	83 (37.1%)	104 (46.4%)	23 (10.3%)
My school had adequate technology to support teachers' use of LDC. (n = 224)	3 (1.3%)	16 (7.1%)	115 (51.3%)	90 (40.2%)
It was easy to find and adapt LDC mini-tasks for use in my classroom. (n = 224)	7 (3.1%)	35 (15.6%)	135 (60.3%)	47 (21.0%)

13 Areas for Improvement

There have been a number of supports for implementation of LDC in your school, including:

- CoreTools online platform
- LDC online courses in the "Learn" section of CoreTools
- Virtual coaching
  - Zoom meetings, written feedback on teacher work in LDC CoreTools, emails, etc.
- In-person coaching
  - Summer training, in-person support visits from LDC and District Lead, in-person professional development opportunities, etc.

T39. What supports did you find the most useful and why?

T40. What supports were not helpful and why?

T41. In what ways could LDC implementation be improved in your school in the future?

Appendix B:
Teacher Leader Survey and Responses

2018–2019
LDC Teacher Leader Survey

1 LDC Participation

TL1. Prior to the current school year (2018-19), did you have any experience with LDC?

		(n = 37)
☐	Yes	34 teacher leaders (91.9%)
☐	No ↓ Skip toTL3	3 teacher leaders (8.1%)

TL2. How many of the following did you teach prior to the current school year (2018-19)?

☐	LDC modules	n = 34, Mean = 2.38, Range: 0-10
☐	LDC mini-tasks, outside of modules	n = 34, Mean = 3.06, Range: 0-16

2 Professional Learning Community and Teacher Collaboration

The following questions involve the LDC Professional Learning Community (PLC) that you are leading.

TL3. About how often did your LDC PLC meet?

			(n = 37)
☐	Less than once a month		1 teacher leader (2.7%)
☐	Once a month		8 teacher leaders (21.6%)
☐	Every other week		24 teacher leaders (64.9%)
☐	Once a week	↓ Skip to TL5	3 teacher leaders (8.1%)
☐	Twice a week or more often	↓ Skip to TL5	1 teacher leader (2.7%)

TL4. What were the primary barriers preventing your LDC PLC from meeting weekly? Select all that apply.

	(n = 33)
☐ PLC time was not protected.	7 teacher leaders (21.2%)
☐ PLC members had limited interest in attending meetings.	9 teacher leaders (27.3%)
☐ School administrator did not make it a priority.	4 teacher leaders (12.1%)
☐ I was unable to provide sufficient organizational support.	1 teacher leader (3.0%)
☐ Not enough teachers participated.	3 teacher leaders (9.1%)
☐ PLC members had other priorities that competed with LDC participation.	15 teacher leaders (45.5%)
☐ Other (please specify) _____	0 teacher leaders (0.0%)

TL5. About how often did you have informal discussions (as opposed to scheduled meetings) about LDC with teachers in your LDC PLC?

	(n = 37)
☐ Less than once a month	2 teacher leaders (5.4%)
☐ Once a month	11 teacher leaders (29.7%)
☐ Every other week	10 teacher leaders (27.0%)
☐ Once a week	10 teacher leaders (27.0%)
☐ Twice a week or more	4 teacher leaders (10.8%)

TL6. On average how long did your school's LDC PLC meetings typically last?

	(n = 37)
☐ Less than 45 minutes	1 teacher leader (2.7%)
☐ 45 to 59 minutes	22 teacher leaders (59.5%)
☐ 60 to 74 minutes	12 teacher leaders (32.4%)
☐ 75 minutes or more	2 teacher leaders (5.4%)

3 Teacher Training and Support

TL7. How effective was your LDC PLC in the following areas?

	Not effective	A little effective	Moderately effective	Very effective
Creating an environment in which teachers are comfortable working together (n = 37)	0 (0.0%)	4 (10.8%)	14 (37.8%)	19 (51.4%)
Fostering an environment where teachers share their instructional plans with colleagues (n = 37)	0 (0.0%)	4 (10.8%)	14 (37.8%)	19 (51.4%)
Allowing space to share student work (n = 37)	0 (0.0%)	5 (13.5%)	15 (40.5%)	17 (45.9%)
Helping teachers learn to improve their LDC instructional plans. (n = 37)	0 (0.0%)	4 (10.8%)	15 (40.5%)	18 (48.6%)

TL8. How would you rate each of the following aspects of the online course material (in the Learn tab in LDC CoreTools) that your coach used or directed you to use?

	Poor	Fair	Good	Excellent
Clarity of information presented (n = 37)	0 (0.0%)	5 (13.5%)	16 (43.2%)	16 (43.2%)
Relevance of information presented (n = 37)	0 (0.0%)	4 (10.8%)	12 (32.4%)	21 (56.8%)
Ease of use (n = 37)	3 (8.1%)	6 (16.2%)	18 (48.6%)	10 (27.0%)
Usefulness of resource documents (e.g., LDC Pitfall Checklist, CCSS Mental Markers, etc.) (n = 37)	1 (2.7%)	5 (13.5%)	13 (35.1%)	18 (48.6%)
Usefulness of videos (n = 37)	3 (8.1%)	7 (18.9%)	18 (48.6%)	9 (24.3%)
Degree to which course material helped teachers to create and/or adapt LDC modules (n = 37)	1 (2.7%)	7 (18.9%)	17 (45.9%)	12 (32.4%)
Opportunity to extend learning when needed or desired (n = 37)	0 (0.0%)	5 (13.5%)	16 (43.2%)	16 (43.2%)

TL9a. Overall, were you able to get the feedback and support you needed from your LDC coach (through written feedback in LDC CoreTools, or coaching and modeling in your LDC PLCs) to plan, teach, reflect on, and revise LDC modules?

(n = 37)

☐ Yes 36 teacher leaders (97.3%)

☐ No 1 teacher leader (2.7%)

TL9b. Did your LDC coach provide written feedback on your module(s) in LDC CoreTools in a timely manner?

(n = 37)

☐ Yes 36 teacher leaders (97.3%)

☐ No 1 teacher leader (2.7%)

TL10. Outside of the PLC meetings with your LDC coach, please indicate whether you used each of the following types of coach support, and how helpful you found these types of support.

	Did not use	Used			
		Not helpful	A little helpful	Moderately helpful	Very helpful
Written feedback in LDC CoreTools from your LDC coach (in the comments areas and/or via the teacher work rubric) (n = 37)	3 (8.1%)	0 (0.0%)	4 (10.8%)	7 (18.9%)	23 (62.2%)
One-on-one Zoom video conference and/or call with your LDC coach (n = 37)	4 (10.8%)	0 (0.0%)	5 (13.5%)	2 (5.4%)	26 (70.3%)
Email or phone communication with your LDC coach (n = 37)	1 (2.7%)	1 (2.7%)	4 (10.8%)	7 (18.9%)	24 (64.9%)
Other (please specify) (n = 37)	27 (73.0%)	1 (2.7%)	1 (2.7%)	1 (2.7%)	7 (18.9%)

TL11. How many in-person and/or online LDC professional development offerings for school administrators and teacher leaders did you attend during the current school (e.g., Summer in-person launch days, Quarterly in-person teacher leader meetings, LDC monthly virtual coach meetings)?

☐ Professional development offerings n = 37, Mean = 6.00, Range: 0-20

4 Support to Teacher Leaders from LDC Coach

TL12. Please indicate the degree to which you agree or disagree with the following statements.

	Strongly disagree	Disagree	Agree	Strongly agree	N/A
I was able to reach my LDC coach if I had any questions about LDC. (n = 37)	0 (0.0%)	2 (5.4%)	6 (16.2%)	28 (75.7%)	1 (2.7%)
LDC provided adequate technical support for issues with the CoreTools online platform. (n = 37)	0 (0.0%)	1 (2.7%)	8 (21.6%)	22 (59.5%)	6 (16.2%)
LDC offered sufficient professional development opportunities for me to lead the initiative in my school. (n = 37)	0 (0.0%)	0 (0.0%)	11 (29.7%)	24 (64.9%)	2 (5.4%)
LDC coaches were able to connect me with additional resources when needed. (n = 37)	0 (0.0%)	2 (5.4%)	8 (21.6%)	25 (67.6%)	2 (5.4%)
It was challenging to coordinate with our LDC coach on how to structure Professional Learning Community time. (n = 37)	12 (32.4%)	9 (24.3%)	6 (16.2%)	8 (21.6%)	2 (5.4%)
When I reached out to our LDC coach, he or she responded quickly. (n = 37)	0 (0.0%)	2 (5.4%)	4 (10.8%)	30 (81.1%)	1 (2.7%)
Our LDC coach was easy to work with (n = 37)	0 (0.0%)	1 (2.7%)	3 (8.1%)	32 (86.5%)	1 (2.7%)
Our LDC coach was knowledgeable and provided high quality guidance. (n = 37)	0 (0.0%)	0 (0.0%)	4 (10.8%)	32 (86.5%)	1 (2.7%)

5 Module Creation

TL13. During the current school year (2018-19), how many LDC modules did your PLC individually or collaboratively adapt from existing modules (e.g., modules created in a prior year and/or modules from the LDC Library in CoreTools)?

☐ Adapted modules n = 37, Mean = 2.92, Range: 0-12

TL14. During the current school year (2018-19), how many LDC modules did your PLC create (either individually or in a group)? Only include modules built from scratch, not those adapted from existing modules in the LDC library.

☐ New modules n = 37, Mean = 1.38, Range: 0-6

TL15. How did members of your PLC collaborate to create LDC modules? Check all that apply.

	(n = 37)
☐ Modules were created by individual teachers.	17 teacher leaders (45.9%)
☐ Modules were created by teams of two or more teachers.	22 teacher leaders (59.5%)
☐ Modules were created by the PLC as a whole.	10 teacher leaders (27.0%)
☐ Other (please specify) _____	4 teacher leaders (10.8%)

TL16. Please indicate to what extent you were able to do each of the following when creating LDC modules.

	Not at all	A little bit	To a moderate extent	To a great extent
Select focus standards for a writing assignment (n = 37)	0 (0.0%)	1 (2.7%)	7 (18.9%)	29 (78.4%)
Create a standards-driven writing assignment (n = 37)	0 (0.0%)	1 (2.7%)	8 (21.6%)	28 (75.7%)
Select high quality, complex texts and other materials to engage students in deeper learning (n = 37)	0 (0.0%)	2 (5.4%)	13 (35.1%)	22 (59.5%)
Identify the skills students need to develop to complete a writing assignment (n = 37)	0 (0.0%)	2 (5.4%)	8 (21.6%)	27 (73.0%)
Create daily lessons to teach the skills a student needs to complete a writing assignment (n = 37)	0 (0.0%)	4 (10.8%)	16 (43.2%)	17 (45.9%)
Differentiate instruction by incorporating multiple ways of thinking, various levels of complexity, and multiple modalities. (n = 37)	1 (2.7%)	5 (13.5%)	14 (37.8%)	17 (45.9%)
Plan for a variety of methods to assess student progress (e.g., rubrics and/or mini-task scoring guides) (n = 37)	2 (5.4%)	4 (10.8%)	17 (45.9%)	14 (37.8%)
Assess the quality of writing assignments and/or instructional plans using Peer Review/Curriculum Alignment Rubric (e.g. Task Pitfalls Checklist, rubric indicators) (n = 37)	1 (2.7%)	4 (10.8%)	11 (29.7%)	21 (56.8%)
Make a writing assignment relevant and engaging for students (n = 37)	0 (0.0%)	2 (5.4%)	10 (27.0%)	25 (67.6%)

6 Impact on Student Learning

TL17. Please indicate to what extent LDC had a positive effect on students in the following areas.

	Not at all	A little	Moderately	A great deal
Reading skills (n = 37)	1 (2.7%)	5 (13.5%)	14 (37.8%)	17 (45.9%)
Content knowledge (n = 37)	0 (0.0%)	5 (13.5%)	12 (32.4%)	20 (54.1%)
Ability to complete writing assignments (n = 37)	0 (0.0%)	6 (16.2%)	10 (27.0%)	21 (56.8%)
Quality of students' writing (n = 37)	0 (0.0%)	6 (16.2%)	9 (24.3%)	22 (59.5%)
College and career ready skills (n = 37)	0 (0.0%)	10 (27.0%)	10 (27.0%)	17 (45.9%)
Capacity to analyze and understand the components of a writing assignment (n = 37)	0 (0.0%)	7 (18.9%)	8 (21.6%)	22 (59.5%)
Speaking and listening skills (n = 37)	0 (0.0%)	7 (18.9%)	13 (35.1%)	17 (45.9%)
Overall literacy performance (n = 37)	0 (0.0%)	5 (13.5%)	13 (35.1%)	19 (51.4%)
Performance on assessments throughout the school year (n = 37)	1 (2.7%)	6 (16.2%)	13 (35.1%)	17 (45.9%)

7 School Administrator Support

The following questions refer to the school administrator who oversees the LDC project at your school.

TL18. What proportion of PLC meetings focused on LDC did your school administrator attend?

	(n = 37)
☐ Less than one quarter of LDC PLCs	9 teacher leaders (24.3)
☐ About one quarter of LDC PLCs	4 teacher leaders (10.8%)
☐ About one half of LDC PLCs	9 teacher leaders (24.3%)
☐ About three quarters of LDC PLCs	6 teacher leaders (16.2%)
☐ More than three quarters of LDC PLCs	9 teacher leaders (24.3%)

TL19. Please indicate the degree to which you agree or disagree with the following statements.

My school administrator…	Strongly disagree	Disagree	Agree	Strongly agree
had a firm understanding of LDC. (n = 37)	2 (5.4%)	6 (16.2%)	21 (56.8%)	8 (21.6%)
allocated resources such as teacher time, payment, administrator time, support staff, sub coverage, etc., to ensure the LDC team could meet. (n = 37)	1 (2.7%)	5 (13.5%)	17 (45.9%)	14 (37.8%)
encouraged teachers to participate in LDC. (n = 37)	0 (0.0%)	3 (8.1%)	15 (40.5%)	19 (51.4%)
expressed concerns that implementing LDC is taking time away from other instructional priorities. (n = 37)	13 (35.1%)	15 (40.5%)	6 (16.2%)	3 (8.1%)
communicated how using LDC's tools supported specific school initiatives and/or goals. (n = 37)	1 (2.7%)	7 (18.9%)	17 (45.9%)	12 (32.4%)
provided me with feedback about my LDC planning and/or instruction. (n = 37)	1 (2.7%)	11 (29.7%)	20 (54.1%)	5 (13.5%)
made formative assessment a priority at my school. (n = 37)	0 (0.0%)	7 (18.9%)	23 (62.2%)	7 (18.9%)
Used LDC to implement standards-driven assignments within existing curriculum. (n = 37)	1 (2.7%)	8 (21.6%)	16 (43.2%)	12 (32.4%)

8 Teacher Leader Leadership Role

TL20. Please indicate the degree to which you agree or disagree with the following statements about your role in leading your school's LDC implementation.

	Strongly disagree	Disagree	Agree	Strongly agree
I met regularly with my school administrator to make planning decisions around LDC. (n = 37)	0 (0.0%)	13 (35.1%)	17 (45.9%)	7 (18.9%)
I was involved in discussions about differentiating LDC implementation to meet teacher learning needs. (n = 37)	0 (0.0%)	4 (10.8%)	19 (51.4%)	14 (37.8%)
I was involved in discussions about how to expand LDC implementation at my school in future years. (n = 37)	0 (0.0%)	7 (18.9%)	17 (45.9%)	13 (35.1%)
My role as an LDC teacher leader allowed me to effectively advocate for additional resources on my campus. (n = 37)	0 (0.0%)	8 (21.6%)	19 (51.4%)	10 (27.0%)
I was involved in adjusting the problems of practice that my school targeted with the LDC work. (n = 37)	0 (0.0%)	6 (16.2%)	20 (54.1%)	11 (29.7%)
I met regularly with my LDC coach to manage the LDC work plan. (n = 37)	0 (0.0%)	6 (16.2%)	9 (24.3%)	22 (59.5%)
I feel that my position as an LDC lead teachers allowed me to build my capacity as an instructional leader among my colleagues. (n = 37)	0 (0.0%)	3 (8.1%)	18 (48.6%)	16 (43.2%)
I am confident that I can lead our LDC PLC in the future without the assistance of an LDC coach. (n = 37)	1 (2.7%)	5 (13.5%)	18 (48.6%)	13 (35.1%)

9 Alignment

TL21. Please indicate the degree to which you agree or disagree with the following statements.

	Strongly disagree	Disagree	Agree	Strongly agree
Our school connected LDC implementation to our specific schoolwide goals. (n = 37)	2 (5.4%)	10 (27.0%)	11 (29.7%)	14 (37.8%)
LDC helped teachers create writing assignments to use within their current curricula. (n = 37)	0 (0.0%)	4 (10.8%)	22 (59.5%)	11 (29.7%)
LDC complemented other initiatives taking place in my school. (n = 37)	0 (0.0%)	8 (21.6%)	19 (51.4%)	10 (27.0%)
I view LDC as a strategy for implementing my state's College- and Career-Ready Standards. (n = 37)	0 (0.0%)	3 (8.1%)	21 (56.8%)	13 (31.5%)
The time spent implementing LDC interfered with other important initiatives at my school. (n = 37)	6 (16.2%)	13 (35.1%)	14 (37.8%)	4 (10.8%)
LDC helped prepare students in my school for current state assessments. (n = 37)	0 (0.0%)	2 (5.4%)	22 (59.5%)	13 (35.1%)
It was difficult for teachers to focus on LDC because of other competing priorities at the school. (n = 37)	2 (5.4%)	7 (18.9%)	22 (59.5%)	6 (16.2%)
Our instructional leaders are using LDC to implement standards-driven assignments within the existing curriculum. (n = 37)	2 (5.4%)	7 (18.9%)	20 (54.1%)	8 (21.6%)

10 Scale-up and Sustainability

TL22. Please indicate the degree to which you agree or disagree with the following statements.

	Strongly disagree	Disagree	Agree	Strongly agree
I expect that most teachers participating in LDC this year will continue to do so next year. (n = 37)	0 (0.0%)	14 (37.8%)	16 (43.2%)	7 (18.9%)
Teachers at my school who were not part of the LDC PLC meetings used the LDC planning process and/or LDC CoreTools. (n = 37)	8 (21.6%)	15 (40.5%)	12 (32.4%)	2 (5.4%)
As a result of LDC, new collaborations across grades and/or subjects were created or are being launched at my school. (n = 37)	3 (8.1%)	14 (37.8%)	15 (40.5%)	5 (13.5%)
Teachers and administrators at my school are committed to sustaining the LDC initiative. (n = 37)	1 (2.7%)	13 (35.1%)	17 (45.9%)	6 (16.2%)
I expect our LDC PLC to increase in size next year. (n = 37)	3 (8.1%)	22 (59.5%)	9 (24.3%)	3 (8.1%)

11 District Support

TL23. Please indicate the degree to which you agree or disagree with the following statements.

	Strongly disagree	Disagree	Agree	Strongly agree	Don't know
District leaders supported the implementation of LDC. (n = 37)	0 (0.0%)	4 (10.8%)	14 (37.8%)	11 (29.7%)	8 (21.6%)
District leaders had a firm understanding of LDC. (n = 37)	0 (2.1%)	7 (18.9%)	7 (18.9%)	10 (27.0%)	13 (35.1%)
District leaders are interested in spreading the use of LDC to additional schools. (n = 37)	0 (0.0%)	6 (16.2%)	5 (13.5%)	10 (27.0%)	16 (43.2%)
District professional development efforts were aligned with the LDC initiative. (n = 37)	1 (2.7%)	7 (18.9%)	6 (16.2%)	11 (29.7%)	12 (32.4%)
District leaders visited my school to discuss the implementation of LDC. (n = 37)	5 (13.5%)	9 (24.3%)	8 (21.6%)	9 (24.3%)	6 (16.2%)

12 Areas for Improvement

There have been a number of supports for implementation of LDC in your school, including:

- CoreTools online platform
- LDC online courses in the "Learn" section of CoreTools
- Virtual coaching
  - Zoom meetings, written feedback on teacher work in LDC CoreTools, emails, etc.
- In-person coaching
  - Summer training, in-person support visits from LDC and District Lead, in-person professional development opportunities, etc.

TL24. What supports did you find the most useful and why?

TL25. What supports were not helpful and why?

TL26. In what ways could LDC implementation be improved in your school in the future?

Appendix C:
Administrator Survey and Responses

2018–2019
LDC School Administrator Survey

1 LDC Participation

A1. What is your role at the school?

(n = 35)

☐	Principal	23 admins (65.7%)
☐	Assistant Principal	8 admins (22.9%)
☐	Other (please specify) _____	4 admins (11.4%)

2 Professional Learning Community

A2. What proportion of LDC Professional Learning Community (PLC) meetings did you attend during the current school year?

(n = 35)

☐	Less than one quarter of LDC PLCs	6 admins (17.1%)
☐	About one quarter of LDC PLCs	7 admins (20.0%)
☐	About one half of LDC PLCs	8 admins (22.9%)
☐	About three quarters of LDC PLCs	7 admins (20.0%)
☐	More than three quarters of LDC PLCs	7 admins (20.0%)

3 Training and Support

A3. How many in-person and/or online LDC professional development offerings for school administrators and teacher leaders did you attend during the current school year (e.g., Summer launch meetings, quarterly in-person administrator meetings, monthly virtual LDC leadership meetings)?

☐ LDC Professional development offerings n = 35, Mean = 5.09, Range: 1-20

A4. Please indicate the degree to which you agree or disagree with the following statements.

	Strongly disagree	Disagree	Agree	Strongly agree	N/A
I was able to reach LDC staff when I had questions about LDC. (n = 35)	0 (0.0%)	0 (0.0%)	6 (17.1%)	29 (82.9%)	0 (0.0%)
My school has adequate technology to access LDC online resources. (n = 35)	0 (0.0%)	0 (0.0%)	6 (17.1%)	29 (82.9%)	0 (0.0%)
LDC offered sufficient professional development opportunities for LDC teacher leaders. (n = 35)	0 (0.0%)	0 (0.0%)	11 (31.4%)	24 (68.6%)	0 (0.0%)
LDC offered sufficient professional development opportunities for school administrators. (n = 35)	0 (0.0%)	0 (0.0%)	10 (28.6%)	25 (71.4%)	0 (0.0%)
LDC staff members were able to connect me with additional resources when needed. (n = 35)	0 (0.0%)	0 (0.0%)	7 (20.0%)	27 (77.1%)	1 (2.9%)

4 Classroom Observation

A5. On average, how many times during the school year did you observe each member of the LDC PLC teaching an LDC module?

(n = 35)

☐	0 times	Skip to A7	2 admins (5.7%)
☐	1 time		12 admins (34.3%)
☐	2 times		7 admins (20.0%)
☐	3 or more times		14 admins (40.0%)

A6. On average, how effective were LDC modules in developing students' literacy skills?

(n = 33)

☐	Not effective	0 admins (0.0%)
☐	A little effective	2 admins (6.1%)
☐	Moderately effective	15 admins (45.5%)
☐	Very effective	16 admins (48.5%)

5 Impact on Teacher Practice

A7. Based on your oversight of the LDC program, please indicate on average how much the teaching practice of LDC PLC members improved in each of the following areas:

	Not at all	A little	Moderately	A great deal
Selecting a set of focus standards for a writing assignment (n = 35)	0 (0.0%)	3 (8.6%)	12 (34.3%)	20 (57.1%)
Creating standards-driven writing assignments (n = 35)	0 (0.0%)	2 (5.7%)	17 (48.6%)	16 (45.7%)
Identifying the skills students need to develop to complete a writing assignment (n = 35)	0 (0.0%)	3 (8.6%)	19 (54.3%)	13 (37.1%)
Creating daily lessons to teach each skill a student needs to complete a writing assignment (n = 35)	0 (0.0%)	6 (17.1%)	21 (60.0%)	8 (22.9%)
Systematically collecting information on students' progress. (n = 35)	0 (0.0%)	7 (20.0%)	20 (57.1%)	8 (22.9%)
Identifying patterns of student understandings or misconceptions (n = 35)	0 (0.0%)	5 (14.3%)	19 (54.3%)	11 (31.4%)
Using evidence of student progress on standards to modify subsequent instruction (n = 35)	0 (0.0%)	6 (17.1%)	21 (60.0%)	8 (22.9%)

6 Impact on Student Learning

A8. Please indicate to what extent LDC had a positive effect on students in the following areas:

	Not at all	A little	Moderately	A great deal
Reading skills (n = 35)	0 (0.0%)	10 (28.6%)	18 (51.4%)	7 (20.0%)
Content knowledge (n = 35)	0 (0.0%)	6 (17.1%)	15 (42.9%)	14 (40.0%)
Ability to complete writing assignments (n = 35)	0 (0.0%)	1 (2.9%)	18 (51.4%)	16 (45.7%)
Quality of students' writing (n = 35)	0 (0.0%)	3 (8.6%)	17 (48.6%)	15 (42.9%)
College and career ready skills (n = 35)	0 (0.0%)	7 (20.0%)	18 (51.4%)	10 (28.6%)
Capacity to analyze and understand the components of a writing assignment (n = 35)	0 (0.0%)	4 (11.4%)	13 (37.1%)	18 (51.4%)
Speaking and listening skills (n = 35)	1 (2.9%)	9 (25.7%)	16 (45.7%)	9 (25.7%)
Overall literacy performance (n = 35)	0 (0.0%)	5 (14.3%)	23 (65.7%)	7 (20.0%)
Performance on assessments throughout the school year (n = 35)	0 (0.0%)	10 (28.6%)	20 (57.1%)	5 (14.3%)

7 Administrator Leadership Role

A9. Please indicate the degree to which you agree or disagree with the following statements about your role in leading LDC implementation in your school:

	Strongly disagree	Disagree	Agree	Strongly agree
I was able to shape LDC implementation at my school. (n = 35)	1 (2.9%)	4 (11.4%)	23 (65.7%)	7 (20.0%)
I met regularly with the LDC teacher leader in my school to stay abreast of implementation progress. (n = 35)	0 (0.0%)	3 (8.6%)	27 (77.1%)	5 (14.3%)
I was involved in discussions about differentiating LDC implementation to meet teacher learning needs. (n = 35)	0 (0.0%)	3 (8.6%)	28 (80.0%)	4 (11.4%)
I led discussions about how to expand my school's LDC implementation in future years. (n = 35)	1 (2.9%)	7 (20.0%)	22 (62.9%)	5 (14.3%)
I made changes to school schedules to accommodate LDC professional learning time. (n = 35)	1 (2.9%)	4 (11.4%)	14 (40.0%)	16 (45.7%)
I allocated resources such as teacher time, payment, administrator time, support staff, sub coverage, etc., to ensure the LDC team could meet. (n = 35)	1 (2.9%)	2 (5.7%)	16 (45.7%)	16 (45.7%)

8 Alignment

A10. Please indicate the degree to which you agree or disagree with the following statements:

	Strongly disagree	Disagree	Agree	Strongly agree
Our school connected LDC implementation to our specific schoolwide goals. (n = 35)	0 (0.0%)	6 (17.1%)	21 (60.0%)	8 (22.9%)
LDC helped teachers create writing assignments to use within their current curricula. (n = 35)	0 (0.0%)	2 (5.7%)	23 (65.7%)	10 (28.6%)
LDC complemented other initiatives taking place in my school. (n = 35)	0 (0.0%)	1 (2.9%)	25 (71.4%)	9 (25.7%)
I view LDC as a strategy for implementing my state's College- and Career-Ready Standards. (n = 35)	0 (0.0%)	2 (5.7%)	23 (65.7%)	10 (28.6%)
The time spent implementing LDC interfered with other important initiatives at my school. (n = 35)	8 (22.9%)	14 (40.0%)	10 (28.6%)	3 (8.6%)
LDC helped prepare students in my school for current state assessments. (n = 35)	0 (0.0%)	3 (8.6%)	25 (71.4%)	7 (20.0%)
It was difficult for teachers to focus on LDC because of other competing priorities at the school. (n = 35)	4 (11.4%)	16 (45.7%)	11 (31.4%)	4 (11.4%)
I am using LDC to implement standards-driven assignments within the existing curriculum. (n = 35)	1 (2.9%)	3 (8.6%)	23 (65.7%)	8 (22.9%)
LDC helped improve teacher evaluation ratings. (n = 35)	1 (2.9%)	11 (31.4%)	20 (57.1%)	3 (8.6%)

9 Scale-up and Sustainability

A11. Please indicate the degree to which you agree or disagree with the following statements:

	Strongly disagree	Disagree	Agree	Strongly agree	Don't know
I expect that most teachers participating in LDC this year will continue to do so next year. (n = 35)	0 (0.0%)	3 (8.6%)	20 (57.1%)	9 (25.7%)	3 (8.6%)
Teachers at my school who were not part of the LDC PLC meetings used the LDC planning process and/or LDC CoreTools. (n = 35)	1 (2.9%)	21 (60.0%)	7 (20.0%)	3 (8.6%)	3 (8.6%)
As a result of LDC, new collaborations across grades and/or subjects were created or are being launched at my school. (n = 35)	2 (5.7%)	7 (20.0%)	19 (54.3%)	5 (14.3%)	2 (5.7%)
Teachers and administrators at my school are committed to sustaining the LDC initiative. (n = 35)	0 (0.0%)	4 (11.4%)	22 (62.9%)	8 (22.9%)	1 (2.9%)
I expect our LDC PLC to increase in size next year. (n = 35)	1 (2.9%)	16 (45.7%)	12 (34.3%)	4 (11.4%)	2 (5.7%)

10 District Support

A12. Please indicate the degree to which you agree or disagree with the following statements:

	Strongly disagree	Disagree	Agree	Strongly agree	Don't know
District leaders supported the implementation of LDC. (n = 35)	0 (0.0%)	5 (14.3%)	15 (42.9%)	6 (17.1%)	9 (25.7%)
District leaders had a firm understanding of LDC. (n = 35)	0 (0.0%)	8 (22.9%)	13 (37.1%)	4 (11.4%)	10 (28.6%)
District leaders are interested in spreading the use of LDC to additional schools. (n = 35)	0 (0.0%)	6 (17.1%)	13 (37.1%)	2 (5.7%)	14 (40.0%)
District professional development efforts were aligned with the LDC initiative. (n = 35)	1 (2.9%)	10 (28.6%)	17 (48.6%)	1 (2.9%)	6 (17.1%)
District leaders visited my school to discuss the implementation of LDC. (n = 35)	3 (8.6%)	12 (34.3%)	15 (42.9%)	1 (2.9%)	4 (11.4%)

11 Areas for Improvement

There have been a number of supports for implementation of LDC in your school, including:

- *CoreTools online platform*
- *LDC online courses in the "Learn" section of CoreTools*
- *Virtual coaching*
  - *Zoom meetings, written feedback on teacher work in LDC CoreTools, emails, etc.*
- *In-person coaching*
  - *Summer training, in-person support visits from LDC and District Lead, in-person professional development opportunities, etc.*

A13. What supports did you find the most useful and why?

A14. What supports were not helpful and why?

A15. In what ways could LDC implementation be improved in your school in the future?

Appendix D:
LDC Module Rating Dimensions

Each module was rated on six dimensions. All of these were rated using a 5-point scale. With the first five, anchor points ranged from not present or realized to fully present or realized. In contrast, the overall dimension ranged from inadequate to advanced.

Dimension **1** **Effective Writing Task**

Definition

Degree to which teaching task makes effective use of the template task's writing mode (i.e., argumentation or explanation); requires sustained writing and effective use of ideas and evidence to substantiate claims; and is feasible for most students to complete (i.e., appropriate for the grade-level and subject matter).

Main Sources of Information

Module Creator Handout (Task)

- Read and evaluate the teaching task, student background/prior knowledge, and summary information.
- Evaluate the difficulty or ease students may encounter trying to answer the question.
- Compare module teaching task to teaching task template options.

Anchor Points	Description
5 Fully Present or Realized	The teaching task and performance expectations for the module are explicit and clear, require students to engage in higher-order thinking and writing, and are appropriate for the grade-level and subject matter.
4 Sufficiently Present or Realized	
3 Moderately Present or Realized	Clear module teaching task and performance expectations are available, but do not require students to engage in higher-order thinking and writing and/or are not appropriate for the grade-level and subject matter.
2 Barely Present or Realized	
1 Not Present or Realized	There is minimal evidence of an effort to identify an explicit and clear teaching task and performance expectations that provide opportunities for students to think critically and are appropriate for the grade-level and subject matter.

Dimension 2

Alignment to CCSS, Local, State Literacy and Content Standards

Definition

Extent to which module addresses content essential to the discipline, as well as reading comprehension and writing standards informed by local and state standards.

Main Sources of Information

Module Creator Handout (Task)

- Read and evaluate the standards included in the module.
- Module should include ELA as well as subject matter CCSS/state standards.
- Compare and contrast the standards the module includes with those that could have been included.
- Particular attention to content standards (CCSS History/Social Studies, Science, and Technical Subjects); State Standards; Specific Reading, Writing, Speaking/Listening, Language Skills

Anchor Points	Description
5 Fully Present or Realized	Module specifically addresses content essential to CCSS and local or state standards in science or social studies, as well as reading comprehension and writing. All standards are well aligned to the topic and teaching task.
4 Sufficiently Present or Realized	
3 Moderately Present or Realized	Module broadly addresses content essential to CCSS and local or state standards in science or social studies and reading comprehension and writing. Standards are sufficiently aligned to the topic and teaching task.
2 Barely Present or Realized	
1 Not Present or Realized	Minimal evidence that module addresses content essential to the discipline and literacy standards. Standards are poorly aligned to the topic and teaching task.

Dimension 3

Fidelity to LDC Module Instruction

Definition

Degree to which module instruction, activities, and teaching task address each of the four stages of instructional practice (preparation for the task, reading process, transition to writing, writing process).

Main Sources of Information

Module Creator Handout (Instruction) and Information Sheet

- Evaluate for distribution of activities and time spent on each of the four stages of instructional practice.

Anchor Points	Description
5 Fully Present or Realized	The module instruction, activities, and teaching task reflect deliberate attention and fidelity to the four discrete stages of LDC module instruction. Classroom materials reflect demonstrable effort to develop instructional scaffolding within and across each stage of instruction.
4 Sufficiently Present or Realized	
3 Moderately Present or Realized	The module instruction, activities, and teaching task reflect moderate attention and fidelity to the four discrete stages of LDC module instruction. Classroom materials reflect sufficient effort to develop instructional scaffolding within and across each stage of instruction.
2 Barely Present or Realized	
1 Not Present or Realized	The module instruction, activities, and teaching task reflect poor attention and lack of fidelity to the four discrete stages of LDC module instruction. Classroom materials reflect inadequate effort to develop instructional scaffolding within and across each stage of instruction.

Dimension 4

Quality Instructional Strategies

Definition

Degree to which the module provides clear instructional strategies aimed at helping students develop literacy skills and successfully complete the teaching task. In addition, the degree to which module instruction and activities scaffold critical thinking and performance in a way that is meaningful within the context of a given field or subject matter.

Main Sources of Information

Module Creator Handout (Instruction), Classroom Handouts, and Student Work

- Evaluate extent to which the module activities scaffold critical thinking and student performance within the context of the subject matter at the core of the teaching task.
- Evaluate extent to which instructional strategies guide student learning in literacy and ability to complete the teaching task.

Anchor Points	Description
5 Fully Present or Realized	Module provides clear and targeted instructional strategies and activities that scaffold student learning and promote critical thinking in social studies or science. There is explicit attention to helping students develop an accurate understanding of the topic and teaching task, and literacy skills necessary to complete the writing task successfully.
4 Sufficiently Present or Realized	
3 Moderately Present or Realized	Instructional strategies and activities are available to support adequate student learning and critical thinking in social studies or science. There is moderate attention to helping students develop an understanding of the topic and teaching task, and literacy skills necessary to complete the writing task.
2 Barely Present or Realized	
1 Not Present or Realized	Limited instructional strategies and activities are available to support student learning and critical thinking in social studies or science. Insufficient attention to helping students develop an understanding of the topic and teaching task, or literacy skills necessary to complete the writing task.

Dimension 5

Coherence and Clarity of Module

Definition

The degree of logical alignment found between the teaching task and the goals of the module with the readings, mini-tasks, and instructional strategies.

Main Sources of Information

Module Creator Handout (Instruction), Classroom Handouts, and Student Work

Anchor Points	Description
5 Fully Present or Realized	Strong alignment between the teaching task and goals of the module—including the CCSS and local and state literacy and content standards—with the readings, mini-tasks, student work, and instructional strategies.
4 Sufficiently Present or Realized	
3 Moderately Present or Realized	Moderate alignment between the teaching task and goals of the module—including the CCSS and local and state literacy and content standards—with the readings, mini-tasks, student work, and instructional strategies.
2 Barely Present or Realized	
1 Not Present or Realized	Poor alignment between the teaching task and goals of the module—including the CCSS and local and state literacy and content standards—with the readings, mini-tasks, student work, and instructional strategies.

Dimension 6

Overall Impression

Definition

A holistic assessment of the LDC Module.

Main Sources of Information

Module Creator Handout, Classroom Handouts, and Student Work

- To what extent does this module contribute to student college readiness and development of advanced literacy skills?

Anchor Points	
5	Advanced LDC Module Implementation
4	Proficient LDC Module Implementation
3	Adequate LDC Module Implementation
2	Marginal LDC Module Implementation
1	Inadequate LDC Module Implementation

Appendix E:
Research Procedure and Results for Principal Interviews

To better understand teacher retention rates of LDC schools after the 2016–2017 school year, we conducted an interview study of school administrators. Twenty principals and assistant principals volunteered to be interviewed. This section presents the methods and results of the principal interviews.

Method

Instrument

We developed a six-question interview protocol for principals and assistant principals. Some of the interview questions had subquestions. Five of the questions were asked of all principals, regardless of their schools' retention typology, and one question (Question 5) differed slightly based on the school's retention typology. See Figure E1 for the interview protocol.

Figure E1

Principal and Assistant Principal Interview Protocol

Question no.	Question	Given to
1	Why did you initially participate in LDC? • What were your goals when you signed on and how well have those goals been met thus far?	All
2	What was your role in LDC implementation? • Who else at the school supported LDC? • How much did you see of PLC meetings? • Was part of your role to give feedback on LDC instruction? (If needed: Who gave feedback on LDC instruction?)	All
3	Could you tell me about outside support – from both LDC and the district – and what worked or didn't work?	All
4	What were the incentives for teachers' participation in LDC? • How would you describe teacher buy-in and commitment to LDC? • Did teachers receive any additional pay? If so, for what?	All
5	What would you say are the main factors that led to not continuing with LDC?	Drop out
	a) Looking across the district, we noticed that some schools chose to continue with LDC for another year and others chose to stop. What would you say are the main factors that led to continuing with LDC? b) We noticed that none of the year-1 teachers participated in Year 2, so the year-2 PLC began with an entirely new set of teachers. Why do you think that was? c) Were there changes in implementation to keep this from happening again the following year?	Zero retention
	a) Looking across the district, we noticed that some schools chose to continue with LDC for another year and others chose to stop. What would you say are the main factors that led to continuing with LDC? b) We noticed that many teachers who participated in Year 1 did not participate in Year 2. Why do you think that was?	Very Low and Low Retention
	a) Looking across the district, we noticed that some schools chose to continue with LDC for another year and others chose to stop. What would you say are the main factors that led to continuing with LDC? b) We noticed that many teachers who participated in Year 1 continued into Year 2. Why do you think that was?	Moderate-High Retention
6	Do you have any advice for strengthening LDC or is there anything else we should know about your experience with LDC?	All

Participants

During the 2016−2017 school year, 48 total schools participated in the i3 LDC program including 28 in the New York City Department of Education (NYCDOE) and 20 in the West Coast school district which is the subject of this report. We categorized the schools into retention typologies based on a school's total teacher participants in 2016−2017 and returning teachers in 2017−2018. Using the proportions of the same teacher participating for the 2 years, we created five school retention typologies:

- dropout (the school has no teachers participating in LDC in 2017−2018);
- zero retention (no 2016−2017 teachers returning to LDC, but new teachers in the school are participating in 2017−2018);
- very low retention (less than 1/3 of teachers returning);
- low retention (between 1/3 and 2/3 returning teachers); and
- moderate to high retention (over 2/3 teachers returning).

Table E1 shows the number of schools per retention typology in NYCDOE and the West Coast district.

Table E1

Number of Schools and Proportion of Retention Typologies for NYCDOE and West Coast District in 2016−2017

Retention type	# NYCDOE schools	% NYCDOE schools	# West Coast district schools	% West Coast district schools
Dropped out after 2016−2017	10	36%	6	30%
Zero retention	1	4%	2	10%
Very low teacher retention	7	25%	3	15%
Low teacher retention	5	18%	2	10%
Moderate to high teacher retention	5	18%	7	35%
Total	28		20	

All LDC schools from the 2016−2017 cohort were contacted for a phone interview by email, and a total of 20 principals and assistant principals (10, or 36%, of NYCDOE schools and 10, or 50%, of West Coast district schools) participated in the interview. Table E2 shows the school retention typologies that are represented in this sample. Of the principals and assistant principals who participated in an interview, most were from very low teacher retention schools (eight participants), followed by moderate to high teacher retention schools (six participants).

We also had three principals or assistant principals from dropout schools participate, two principals from low teacher retention schools, and one principal in a zero retention school.

Table E2

School Retention Typologies Represented in the Study

Retention type	# NYCDOE schools	% NYCDOE schools	# West Coast district schools	% West Coast district schools
Dropped out after 2016–2017	2	20%	1	17%
Zero retention	0	0%	1	50%
Very low teacher retention	5	71%	3	100%
Low teacher retention	1	20%	1	50%
Moderate to high teacher retention	2	40%	4	57%
Total	10		10	

Procedures

We originally contacted principals of all schools except for schools designated as low retention. This was done as sampling strategy for a case study methodology to understand reasons behind high and low retention schools. Initial emails were sent to 41 schools in both districts (23 in NYCDOE and 18 in the West Coast district) the week of June 16, 2018. A minimum of three follow-up emails for nonresponding administrators were sent between June 25 and August 6, 2018. During this window, nine NYCDOE principals or assistant principals participated (39% of schools in the first round) and seven principals from the West Coast district participated (39% of schools in the first round). One West Coast district principal contacted us to say that they did not have enough knowledge about the LDC program in the school because they were the new principal.

Because of the low response rate, we decided to contact the principals in the low teacher retention schools (five in NYCDOE and two in the West Coast district) to increase the numbers of participants. The initial emails for these NYCDOE principals were sent on September 20, 2018, and for West Coast district principals, between October 1 and October 8, 2018. Follow-up emails were sent to NYCDOE and West Coast district principals between the weeks of October 1 and October 19, 2018. We also reached out to the LDC grant directors in NYCDOE and the West Coast district for recruitment support. Between the new round of emails and support from the LDC grant directors, four additional school leaders participated in interviews, bringing our total participants to 20 principals and assistant principals (10, or 36%, of NYCDOE schools and 10, or 50%, of West Coast district schools).

Interviews were scheduled at times most convenient to the principal or assistant principal. Interviews were conducted by two researchers following the protocol, and the interviews ranged from about eight minutes to 30 minutes in length. Participant consent was obtained prior to the interviews, and interviews were recorded.

Analysis

Recordings of interviews were transcribed. (For one interview, due to researcher and equipment error, the interview was not recorded. However, notes taken by the researcher during the interview were used for general counts in the analysis.) Transcriptions were read iteratively and coded for broad themes using grounded theory (Glaser & Strauss, 1967). Multiple close readings of each group transcript were conducted in order to summarize the data and identify themes related to reasons for a school's retention (or lack thereof) of teachers from Year 1 to Year 2 of LDC implementation. A coding scheme was developed based on targeted areas of interest in relation to reasons for retention.

Results

Qualitative results from the data are presented in five main categories: reasons for teachers continuing in LDC, meeting goals, administrator's role, teacher buy-in, and outside support.

Reasons for Teachers Continuing or Leaving LDC in Year 2

To understand why teachers remained or left LDC after Year 1, interview data were coded into three main categories: teacher or grade-level decision, administrative decision, and mandatory participation. In teacher or grade-level decisions, individual teachers, a grade level, or a content-area team were free to decide to return the following year. Administrative decisions typically involved the principal deciding on changing the grade level or content-area teachers who would participate in the second year of implementation (e.g., moving from second-grade to third-grade teachers; dropping mathematics teachers but keeping science teachers in the program). A couple of principals also decided that LDC participation would be better suited for a particular level of teacher. For example, a principal decided to focus Year 2 teacher participation on "teachers that were new to the profession and teachers that were struggling instructionally"; therefore, only a few teachers continued from Year 1 to Year 2 at that site. Mandatory participation, which is based on an administrator's decision, reflected schools where teachers were told that participation in the second year of LDC was not voluntary. Table E3 shows the reasons for retention by school retention typology.

Table E3

Teachers' Participation in LDC in Year 2 by Retention Typology

Retention typology	Teacher/grade level decision	Administrative decision	Mandatory participation
Dropped out after 2016–2017	1	2	0
Zero retention	0	1	0
Very low teacher retention	4	4	0
Low teacher retention	1	0	1
Moderate to high teacher retention	4	0	2
Total	10	7	3

For the three dropout schools in our sample, two of the schools had a change in leadership. One had a new principal who came in before the second year of LDC implementation and decided not to participate in LDC, and the other school had a new superintendent who did not continue partnering with LDC. For the last of the three dropout schools, the small group of teachers who were in the first year of implementation decided not to continue because of "teacher and administrator burn out." This school had too many initiatives that were handled by a small number of administrative staff and the same teachers who were also part of the LDC implementation.

For the one zero retention school in our sample, the principal decided to change the teachers for Year 2. The grade level that was selected to participate in LDC the first year found the program successful, and so for Year 2, "other teachers haven't been exposed, and we wanted more teachers to have access … to spread the wealth within the school," so another grade level was selected to participate. In one of the low retention schools, the principal said that participation in LDC was mandatory, but many of the teachers who were part of Year 1 implementation left the school the following year.

For the 10 schools that were coded as a teacher/grade-level decision, half of those decisions were based on the grade-level or content-area team (e.g., science teachers) deciding to leave LDC because they started a new program or initiative the second year and did not have the time to participate in LDC. For the moderate to high teacher retention schools who were coded as teacher/grade-level decision, the majority of teachers in those schools decided to stay in LDC the second year.

Meeting Goals

We asked participants their reasons for participating in LDC during the first year. The most popular reasons for participating in LDC were its alignment to standards and rigorous tasks. Principals and assistant principals also stated that they felt both teachers and students in their

schools needed assignments where literacy instruction, the writing tasks, and the writing process were a focus. Other responses included wanting better lesson planning, collaboration, and content-area instruction. Interestingly, three principals said that LDC appealed to them as they were new to the school or position.

After stating their reasons for participation, we asked if these goals were met after the first year of implementation. Table E4 shows participant responses to whether goals were met by school typology. The majority of principals and assistant principals responded positively: 12 (60%) said yes, five expressed mixed feelings about accomplishing their original goals for LDC (25%), and three said that their goals were not met (15%). From these responses, meeting goals for LDC did not appear to influence retention of teachers. For example, two of the three dropout schools reported meeting their LDC goals for participation, yet they didn't remain in the program. Teacher retention seemed to be tied more to teacher and principal decisions (see section above).

Table E4

Principal Reponses for LDC Goals by School Typology

	LDC goals met		
School typology	Yes	No	Mixed
Dropped out after 2016–2017	2	1	0
Zero retention	1	0	0
Very low teacher retention	4	1	3
Low teacher retention	1	1	0
Moderate to high teacher retention	4	0	2
Total	12	3	5

Administrator's Role

The majority of principals and assistant principals in our sample reported having an active role in supporting LDC implementation. Sixteen (80%) attended LDC PLCs, and those who could not make the PLCs were able to get a summary of the meetings from their assistant principals or teacher leaders. For those who were able to attend some PLCs, the amount of time they were able to sit in on the PLCs varied. Some principals were only able to drop in for a portion of the PLCs. For example, one principal (moderate to high retention school) said, "I would probably just go in the last 15 minutes. I don't think I was in a full session all the time. But I would touch bases and then each teacher would give me a wrap up summary of what they had done, what they were working on." Others were able to go to almost all PLCs. As the zero retention school principal said, "I was a participant, also, in the learning." Sixteen participants

(80%) also reported that they gave feedback on LDC instruction. However, the degree to which principals or assistant principals gave feedback varied. Table E5 shows the numbers of participants who attended PLCs and provided feedback on LDC instruction.

Table E5

Participation of Principals and Assistant Principals in LDC Implementation by Retention Type

Retention typology	Attended PLCs	Provided feedback
Dropped out after 2016–2017	3	3
Zero retention	1	1
Very low teacher retention	6	6
Low teacher retention	1	2
Moderate to high teacher retention	5	4
Total	16	16

Teacher Buy-in

Most of the principals and assistant principals mentioned increasing skills and knowledge, collaboration, and student achievement and accessing LDC materials as incentives for teachers. Besides these incentives that were actually part of the LDC implementation, a few schools were able to provide additional school-based supports. Eight schools (40%) in our sample reported providing teachers with more tangible incentives for their participation in LDC, such as additional pay and time, and four of the eight gave multiple incentives. Table E6 shows the number of these types of teacher incentives by school typology. No pattern emerges that connects teacher incentives to retention typology. However, it is notable that the majority of schools in the sample did not provide tangible incentives (i.e., pay, extra time, teacher evaluation) to teachers for their participation for LDC.

Table E6

Teacher Incentives by School Typology

Retention typology	Additional pay	Extra time	Teacher evaluation
Dropped out after 2016–2017	0	0	0
Zero retention	1	1	0
Very low teacher retention	2	0	1
Low teacher retention	1	2	0
Moderate to high teacher retention	1	1	1
Total	5	4	2

Five schools (25%) were able to pay teachers for their participation in LDC. Aside from pay, some principals were able to support participating teachers with extra time, such as adjusting the schedule to give teachers more time to meet during the week or giving teachers a release day. For example, the principal from the zero retention school said, "Initially, it was kind of an imposition of time, but when we created extra time and space for the teachers to meet, they were appreciative. So they had more buy-in." Another principal (low retention school) said,

> I make it very easy for teachers, because I've built in time in their schedule for them to meet for LDC. There are no discrepancies in terms of when we should meet or how can we meet, or what needs to be done, which is usually the issue sometimes when it comes to work with outside consultants or providers, right?

Two schools incentivized participation through teacher evaluations. One principal (very low retention school) postponed teacher evaluations for the year. The other principal (moderate to high retention school) said, "I very much tied it to teacher performance and my expectation of what high quality planning looks like." For this principal, they knew LDC would be

> transformative. I knew that if they got through it and actually did it, the carrot would reveal itself in the students' performance. And I knew my teachers were committed; I knew they wanted our kids to do well. They just needed to be pushed through the process to see how to get the kids to do well.

Outside Support

Overwhelmingly positive responses were reported from our sample regarding LDC support the schools received. All principals and assistant principals mentioned either training or

coaching that LDC provided. Two principals, both from very low retention schools, also mentioned that the administrator meetings were helpful. As one principal described, “It gave an opportunity to speak to other people who were in the project, and it also gave an opportunity to actually go through all of the CoreTools that were there to support the teachers.” Two principals (both from New York) also found site visits to another school helpful: “There are sites where the work is going on really nicely, and we were able to go over to those sites and see presentations from the principal and her teachers on how they have embedded this entire system into their daily program.” Five participants mentioned district support being available.

Discussion

Participants in this study all reported playing an active role in LDC implementation at their school site, and most said that their goals for participation were met. They also overwhelmingly responded favorably to LDC support, and district support, if provided or perceived, was also helpful. The principal interviews showed the diversity of reasons for why schools were able to retain teachers, and they also show why teachers left. The main reason for teacher retention was teacher and grade-level team decisions to leave or stay, followed by the principals’ decision to switch participation of teachers from Year 1 to Year 2. Teacher buy-in also seemed to affect teachers’ decisions for remaining or continuing. We did not find any consistent trends for retention typology; that is, we cannot characterize reasons for each retention typology and say, for example, all dropout schools had these characteristics or most moderate to high retention schools had other characteristics. Teacher retention in LDC from Year 1 to Year 2 was due to a myriad of factors that worked in combination at each school.

Appendix F:
Additional Results on Module Artifact Ratings

The following presents further details of the module analyses. First we present the methodology and results of the generalizability theory studies. This is followed by the additional tables for the descriptive analyses.

Generalizability Study

Generalizability theory is a statistical framework for examining multiple sources of potential error during the scoring process. For each grade band, we first modeled score variability across all six dimensions using a two-faceted design, whereby we estimated variance components for module by rater by dimension (t*r*d). The goal here was to separate true variation in the modules from other potential sources of measurement error. The main effects reflect true variation across modules (σ2t) and error variance across raters (σ2r) and dimensions (σ2d), while the error term (σ2trd,e) reflects unexplained residual error in the model. To disentangle the sources of potential error further, we also used a single-faceted design to examine potential error within the scoring of each dimension. As with the first set of models, the main effect reflects true variation across teachers (σ2t) and error variance across raters (σ2r).

Elementary Module Results

Generalizability theory models were conducted to examine potential error in the scoring process for the elementary modules. Results from the two-faceted and one-faceted models that examine error across and within dimensions are presented in Tables F1 and F2. As would be the goal of any rating session, most of the variation found for the elementary modules was due directly to differences in the modules (57%) or to differences in the modules by dimension (35%). Despite this, 7% of the variation was due either directly or through interaction with the raters. Finally, only 0.09% of the variation was unexplained by the two-faceted model used.

As previously mentioned, we also used a one-faceted design to disentangle variation in the ratings that was due either directly or through interaction with the dimensions (see Table F2). As would be desired, the greatest source of variation for each dimension was due directly to differences in the modules. Despite this, moderate amounts of variation could be attributed either directly or through interaction with the raters for two of the dimensions. More specifically, with Dimension 4, which measures the quality of the instructional strategies used, 9% of the variation was due to the raters and 24% was due to an interaction between raters and modules. In addition, with Dimension 6, which measures the raters' overall impression of the module, 19% of the variation was due either directly or through interaction with the raters. Finally, there was no unexplained error variance detected by the models.

Table F1

Generalizability Study of the Elementary Module Ratings Across Dimensions (n = 139)

Source	Var.	%
Module (σ2t)	0.73	57.17
Rater (σ2r)	0.05	4.07
Dimension (σ2d)	0.01	0.39
Module × Dimension (σ2td)	0.45	35.15
Rater × Dimension (σ2rd)	0.02	1.22
Module × Rater (σ2tr)	0.02	1.90
Error (σ2trd,e)	0.00	0.09

Table F2

Generalizability Study of the Elementary Module Ratings for Each Dimension (n = 139)

	Module (σ2t)		Rater (σ2r)		Module × Rater (σ2tr)		Error (σ2trd,e)	
Dimension	Var.	%	Var.	%	Var.	%	Var.	%
1. Effective writing task	0.99	90.94	0.05	4.83	0.00	0.00	0.00	0.00
2. Standards alignment	1.39	94.32	0.05	3.48	0.03	2.20	0.00	0.00
3. Fidelity to LDC instruction	1.36	94.12	0.05	3.67	0.00	0.00	0.00	0.00
4. Quality instructional strategies	1.12	66.82	0.16	9.26	0.40	23.92	0.00	0.00
5. Coherence/clarity of module	1.15	87.82	0.07	5.49	0.00	0.00	0.00	0.00
6. Overall impression	0.92	80.87	0.15	5.83	0.15	13.30	0.00	0.00

Note. Negative estimates of variance were changed to zero in order to calculate percentages (see Shavelson & Webb, 1991).

Secondary Module Results

Generalizability theory models were conducted to examine potential error in the scoring process for the secondary modules. Tables F3 and F4 present results from the two-faceted and one-faceted models that examine error across and within dimensions. As would be the goal of any rating session, most of the variation found in the ratings was due directly to differences in the modules (38%) or to differences in the modules by dimension (48%). Furthermore, only 7% of the variation for the secondary modules was due either directly or indirectly to the raters. What is of concern, though, is that 4% of the variation in ratings for the two-faceted model was unexplained.

Table F3

Generalizability Study of the Secondary Module Ratings Across Dimensions (n = 66)

Source	Var.	%
Module (σ2t)	0.37	38.44
Rater (σ2r)	0.00	0.00
Dimension (σ2d)	0.02	1.89
Module × Dimension (σ2td)	0.47	48.27
Rater × Dimension (σ2rd)	0.05	5.21
Module × Rater (σ2tr)	0.02	2.16
Error (σ2trd,e)	0.04	4.03

We also used a one-faceted design to disentangle the variance that was due either directly or through interaction with the dimensions (see Table F4). As would be desired, 77% to 90% of the variance found for each dimension was attributable to differences in the modules. Furthermore, only two dimensions had moderate amounts of variance due directly to the raters (Dimension 2 = 12%, Dimension 5 = 9%). The only concerns involved the moderate amounts of variance due to an interaction between modules and raters for the dimensions (8% to 20%), with the greatest amount being found for Dimension 6, which measures the raters' overall impression of module quality. Finally, there was no unexplained error variance found for any of the one-faceted models.

Table F4

Generalizability Study of the Secondary Module Ratings for Each Dimension (n = 66)

	Module (σ2t)		Rater (σ2r)		Module × Rater (σ2tr)		Error (σ2trd,e)	
Dimension	Var.	%	Var.	%	Var.	%	Var.	%
1. Effective writing task	0.73	89.96	0.00	0.00	0.08	10.04	0.00	0.00
2. Standards alignment	0.60	77.44	0.09	11.78	0.08	10.79	0.00	0.00
3. Fidelity to LDC instruction	1.00	87.71	0.00	0.00	0.14	12.29	0.00	0.00
4. Quality instructional strategies	0.92	84.53	0.01	0.99	0.16	14.49	0.00	0.00
5. Coherence/clarity of module	0.85	83.61	0.09	8.62	0.08	7.77	0.00	0.00
6. Overall impression	0.56	79.84	0.00	0.00	0.14	20.16	0.00	0.00

Note. Negative estimates of variance were changed to zero in order to calculate percentages (see Shavelson & Webb, 1991).

Summary

Generalizability models were fit for the overall samples for the two grade bands. As would be hoped for, when examining the one-faceted models, the majority of variation for the elementary and secondary ratings were due directly to differences in the modules (57%, 38%) or to differing quality in the modules across dimensions (35%, 48%). Likewise, results from the two-faceted models showed that the majority of variation within dimension was due to differences in both the elementary modules (67% to 94%) and secondary modules (77% to 90%). Despite this, for the elementary modules 24% of the variation for Dimension 4, which measures quality instructional strategies, and 13% of the variation for Dimension 6, which measures overall quality, were due to an interaction between the raters and modules. In contrast, variation due to an interaction between raters and the secondary modules ranged from 8% to 20% depending upon the dimension, with the greatest amount found for Dimension 6.

Descriptive Results

The following section presents percentages for the elementary and secondary modules. This includes the overall results, and then results broken down by content area and then cohort group.

Table F5

Distribution (Percentage) of Ratings for the Modules

Dimension	1	2	3	4	5
Elementary (*n* = 104)					
1. Effective writing task	2.9	13.5	35.6	32.7	15.4
2. Standards alignment	8.7	15.4	31.7	28.8	15.4
3. Fidelity to LDC instruction	11.5	24.0	27.9	26.0	10.6
4. Quality instructional strategies	9.6	17.3	32.7	26.0	14.4
5. Coherence/clarity of module	7.7	18.3	33.7	26.0	14.4
6. Overall impression	2.9	19.2	40.4	25.0	10.6
Secondary (*n* = 51)					
1. Effective writing task	0.0	7.8	29.4	35.3	27.5
2. Standards alignment	0.0	3.9	37.3	33.3	25.5
3. Fidelity to LDC instruction	5.9	11.8	29.4	37.3	15.7
4. Quality instructional strategies	5.9	5.9	23.5	43.1	21.6
5. Coherence/clarity of module	3.9	7.8	29.4	41.2	17.6
6. Overall impression	2.0	5.9	37.3	41.2	13.7
Overall (*n* = 155)					
1. Effective writing task	1.9	11.6	33.5	33.5	19.4
2. Standards alignment	5.8	11.6	33.5	30.3	18.7
3. Fidelity to LDC instruction	9.7	20.0	28.4	29.7	12.3
4. Quality instructional strategies	8.4	13.5	29.7	31.6	16.8
5. Coherence/clarity of module	6.5	14.8	32.3	31.0	15.5
6. Overall impression	2.6	14.8	39.4	30.3	11.6

Table F6

Distribution (Percentage) of Ratings for the Elementary Modules by Content Area

Dimension	1	2	3	4	5
ELA (*n* = 38)					
1. Effective writing task	0.0	10.5	44.7	36.8	7.9
2. Standards alignment	0.0	13.2	55.3	23.7	7.9
3. Fidelity to LDC instruction	0.0	21.1	39.5	23.7	15.8
4. Quality instructional strategies	0.0	15.8	34.2	34.2	15.8
5. Coherence/clarity of module	0.0	15.8	28.9	36.8	18.4
6. Overall impression	0.0	15.8	44.7	26.3	13.2
Science (*n* = 43)					
1. Effective writing task	0.0	11.6	27.9	39.5	20.9
2. Standards alignment	11.6	9.3	11.6	46.5	20.9
3. Fidelity to LDC instruction	16.3	18.6	23.3	32.6	9.3
4. Quality instructional strategies	11.6	9.3	39.5	23.3	16.3
5. Coherence/clarity of module	9.3	14.0	39.5	20.9	16.3
6. Overall impression	0.0	18.6	41.9	27.9	11.6
Social studies (*n* = 23)					
1. Effective writing task	13.0	21.7	34.8	13.0	17.4
2. Standards alignment	17.4	30.4	30.4	4.3	17.4
3. Fidelity to LDC instruction	21.7	39.1	17.4	17.4	4.3
4. Quality instructional strategies	21.7	34.8	17.4	17.4	8.7
5. Coherence/clarity of module	17.4	30.4	30.4	17.4	4.3
6. Overall impression	13.0	26.1	30.4	17.4	4.3

Table F7

Distribution (Percentage) of Ratings for the Elementary Modules by Cohort

Dimension	1	2	3	4	5
Cohort1, 2016–2017 (*n* = 16)					
1. Effective writing task	6.3	18.8	6.3	56.3	12.5
2. Standards alignment	12.5	0.0	18.8	50.0	18.8
3. Fidelity to LDC instruction	25.0	6.3	31.3	31.3	6.3
4. Quality instructional strategies	18.8	6.3	37.5	25.0	12.5
5. Coherence/clarity of module	18.8	12.6	25.0	31.3	12.5
6. Overall impression	0.0	6.3	12.5	37.5	31.3
Cohort 2, 2017–2018 (*n* = 51)					
1. Effective writing task	2.0	9.8	45.1	27.5	15.7
2. Standards alignment	9.8	15.7	41.2	19.6	13.7
3. Fidelity to LDC instruction	9.8	17.6	37.3	23.5	11.8
4. Quality instructional strategies	7.8	13.7	39.2	23.5	15.7
5. Coherence/clarity of module	5.9	17.6	37.3	27.5	11.8
6. Overall impression	0.0	3.9	17.6	47.1	23.5
Cohort 2, 2018–2019 (*n* = 30)					
1. Effective writing task	3.3	13.3	33.3	30.0	20.0
2. Standards alignment	6.7	13.3	23.3	36.7	20.0
3. Fidelity to LDC instruction	10.0	33.3	13.3	30.0	13.3
4. Quality instructional strategies	10.0	16.7	23.3	33.3	16.7
5. Coherence/clarity of module	6.7	13.3	33.3	23.3	23.3
6. Overall impression	3.3	0.0	20.0	33.3	26.7

Note. Cohort groups with less than five are not presented.

Table F8

Distribution (Percentage) of Ratings for the Secondary Modules by Content Area

Dimension	1	2	3	4	5
ELA (*n* = 32)					
1. Effective writing task	0.0	9.4	18.8	37.5	34.4
2. Standards alignment	0.0	6.3	34.4	28.1	31.3
3. Fidelity to LDC instruction	6.3	15.6	28.1	28.1	21.9
4. Quality instructional strategies	6.3	6.3	28.1	28.1	31.3
5. Coherence/clarity of module	6.3	9.4	31.3	28.1	25.0
6. Overall impression	3.1	9.4	37.5	31.3	18.8
Science (*n* = 3)					
1. Effective writing task	—	—	—	—	—
2. Standards alignment	—	—	—	—	—
3. Fidelity to LDC instruction	—	—	—	—	—
4. Quality instructional strategies	—	—	—	—	—
5. Coherence/clarity of module	—	—	—	—	—
6. Overall impression	—	—	—	—	—
Social studies (*n* = 16)					
1. Effective writing task	0.0	6.3	50.0	31.3	12.5
2. Standards alignment	0.0	0.0	50.0	43.8	6.3
3. Fidelity to LDC instruction	6.3	6.3	25.0	56.3	6.3
4. Quality instructional strategies	6.3	0.0	12.5	75.0	6.3
5. Coherence/clarity of module	0.0	0.0	18.8	75.0	6.3
6. Overall impression	0.0	0.0	31.3	62.5	6.3

Note. Content areas with less than five are not presented.

Table F9

Distribution (Percentage) of Ratings for the Secondary Modules by Cohort

Dimension	1	2	3	4	5
Cohort 1, 2017–2018 (*n* = 6)					
1. Effective writing task	0.0	33.3	0.0	66.7	0.0
2. Standards alignment	0.0	0.0	16.7	50.0	33.3
3. Fidelity to LDC instruction	0.0	33.3	50.0	16.7	0.0
4. Quality instructional strategies	0.0	0.0	16.7	66.7	16.7
5. Coherence/clarity of module	0.0	0.0	16.7	66.7	16.7
6. Overall impression	0.0	0.0	50.0	50.0	0.0
Cohort 2, 2017–2018 (*n* = 26)					
1. Effective writing task	0.0	3.8	30.8	30.8	34.6
2. Standards alignment	0.0	7.7	38.5	30.8	23.1
3. Fidelity to LDC instruction	3.8	11.5	38.5	30.8	15.4
4. Quality instructional strategies	3.8	7.7	30.8	34.6	23.1
5. Coherence/clarity of module	3.8	7.7	34.6	34.6	19.2
6. Overall impression	0.0	3.8	50.0	30.8	15.4
Cohort 2, 2018–2019 (*n* = 13)					
1. Effective writing task	0.0	7.7	53.8	23.1	15.4
2. Standards alignment	0.0	0.0	38.5	46.2	15.4
3. Fidelity to LDC instruction	7.7	7.7	15.4	46.2	23.1
4. Quality instructional strategies	7.7	7.7	7.7	61.5	15.4
5. Coherence/clarity of module	0.0	15.4	15.4	61.5	7.7
6. Overall impression	0.0	15.4	15.4	61.5	7.7

Note. Cohort groups with less than five are not presented.

Table F10

Means and Standard Deviations for the Exploratory Analysis of Elementary Modules by Cohort

Dimension	2017–2018	2018–2019	Change
Cohort 1 (*n* = 9)			
1. Effective writing task	3.78 (0.83)	2.89 (0.93)	-0.89 (0.93)
2. Standards alignment	3.89 (0.78)	3.00 (1.22)	-0.89 (1.27)
3. Fidelity to LDC instruction	3.44 (1.33)	2.89 (1.27)	-0.56 (1.33)
4. Quality instructional strategies	3.00 (1.66)	3.00 (1.22)	0.00 (1.94)
5. Coherence/clarity of module	3.22 (1.48)	3.11 (1.27)	-0.11 (1.05)
6. Overall impression	3.22 (1.64)	3.22 (0.97)	0.00 (1.41)
Average (Dimensions 1 to 5)	3.47 (1.08)	2.98 (0.94)	-0.49 (0.81)
Cohort 2 (*n* = 31)			
1. Effective writing task	4.39 (0.72)	3.52 (0.85)	-0.87 (1.12)
2. Standards alignment	3.97 (0.87)	3.23 (1.26)	-0.74 (1.59)
3. Fidelity to LDC instruction	4.10 (1.25)	3.23 (1.23)	-0.87 (1.06)
4. Quality instructional strategies	4.10 (1.11)	3.52 (1.06)	-0.58 (1.34)
5. Coherence/clarity of module	4.03 (0.98)	3.55 (0.96)	-0.48 (1.03)
6. Overall impression	4.00 (1.00)	3.42 (0.89)	-0.58 (1.12)
Average (Dimensions 1 to 5)	4.12 (0.85)	3.41 (0.85)	-0.71 (0.98)

Table F11

Means and Standard Deviations for the Exploratory Analysis of Secondary Modules by Cohort

Dimension	2017–2018	2018–2019	Change
Cohort 1 (*n* = 7)			
1. Effective writing task	4.14 (0.90)	4.00 (1.00)	-0.14 (1.46)
2. Standards alignment	3.71 (0.95)	4.43 (0.79)	0.71 (1.38)
3. Fidelity to LDC instruction	4.00 (0.82)	3.29 (0.76)	-0.71 (1.11)
4. Quality instructional strategies	4.00 (1.00)	4.00 (0.82)	0.00 (0.82)
5. Coherence/clarity of module	3.57 (1.90)	4.00 (0.82)	0.43 (1.40)
6. Overall impression	4.00 (0.58)	3.86 (0.69)	-0.14 (0.90)
Average (Dimensions 1 to 5)	3.89 (0.65)	3.94 (0.59)	0.06 (0.81)
Cohort 2 (*n* = 20)			
1. Effective writing task	3.40 (1.27)	4.05 (0.94)	0.65 (1.42)
2. Standards alignment	3.40 (0.88)	3.70 (0.92)	0.30 (1.38)
3. Fidelity to LDC instruction	3.60 (1.14)	3.30 (1.03)	-0.30 (1.45)
4. Quality instructional strategies	3.80 (1.11)	3.70 (1.17)	-0.10 (1.37)
5. Coherence/clarity of module	3.90 (0.79)	3.70 (0.92)	-0.20 (1.01)
6. Overall impression	3.75 (0.85)	3.65 (0.81)	-0.10 (1.17)
Average (Dimensions 1 to 5)	3.62 (0.76)	3.69 (0.69)	0.07 (0.93)

Table F12

Distribution (Percentage) of Ratings for the Exploratory Analysis of Elementary Modules by Cohort

Dimension	Negative		No change		Positive	
	#	%	#	%	#	%
Cohort 1 (*n* = 9)						
1. Effective writing task	7	77.8	1	11.1	1	11.1
2. Standards alignment	5	55.6	3	33.3	1	11.1
3. Fidelity to LDC instruction	5	55.6	1	11.1	3	33.3
4. Quality instructional strategies	3	33.3	1	11.1	5	55.6
5. Coherence/clarity of module	3	33.3	3	33.3	3	33.3
6. Overall impression	3	33.3	4	44.4	2	22.2
Average (Dimensions 1 to 5)	5	55.6	2	22.2	2	22.2
Cohort 2 (*n* = 31)						
1. Effective writing task	23	74.2	4	12.9	4	12.9
2. Standards alignment	15	48.4	10	32.3	6	19.4
3. Fidelity to LDC instruction	17	54.8	12	38.7	2	6.5
4. Quality instructional strategies	19	61.3	5	16.1	7	22.6
5. Coherence/clarity of module	17	54.8	7	22.6	7	22.6
6. Overall impression	18	58.1	7	22.6	6	19.4
Average (Dimensions 1 to 5)	22	71.0	3	9.7	6	19.4

Table F13

Distribution (Percentage) of Ratings for the Exploratory Analysis of Secondary Modules by Cohort

Dimension	Negative		No change		Positive	
	#	%	#	%	#	%
Cohort 1 (*n* = 7)						
1. Effective writing task	4	57.1	0	0.0	3	42.9
2. Standards alignment	2	28.6	1	14.3	4	57.1
3. Fidelity to LDC instruction	3	42.9	4	57.1	0	0.0
4. Quality instructional strategies	2	28.6	3	42.9	2	28.6
5. Coherence/clarity of module	2	28.6	2	28.6	3	42.9
6. Overall impression	3	42.9	2	28.6	2	28.6
Average (Dimensions 1 to 5)	4	57.1	0	0.0	3	42.9
Cohort 2 (*n* = 20)						
1. Effective writing task	5	25.0	4	20.0	11	55.0
2. Standards alignment	6	30.0	5	25.0	9	45.0
3. Fidelity to LDC instruction	7	35.0	9	45.0	4	20.0
4. Quality instructional strategies	7	35.0	7	35.0	6	30.0
5. Coherence/clarity of module	8	40.0	6	30.0	6	30.0
6. Overall impression	8	40.0	6	30.0	6	30.0
Average (Dimensions 1 to 5)	8	40.0	2	10.0	10	50.0

Appendix G:
Fidelity Matrix

Indicators	Definition	Unit of implem-entation	Data Source	Data Collection (who, when)	Score for levels of implementation at unit level	Threshold for adequate implementation at unit level	Roll-up to next higher level if needed (score and threshold): School level	Roll-up to program level (score and threshold for adequate implementation at sample level)	Expected sample for fidelity measure	Expected years of fidelity measurement
1. Key Component = Common Planning time for LDC Professional Learning Community with Synchronous Coach Support										
Teacher Attendance at weekly PLC meetings	Expectation that PLC teachers will regularly attend PLC meetings.	Teacher	PLC Reflection form will include attendance record for both coach-facilitated and teacher leader-facilitated PLC meetings	Reflection form will be filled out by Teacher Leader for each weekly PLC session. LDC will deliver attendance data to CRESST twice per year.	0 (very low) = less than 70% attendance at PLC sessions 1 (low) = 70-79% attendance at PLC sessions 2 (moderate) = 80-89% attendance at PLC sessions 3 (ideal) = at least 90% attendance at PLC sessions	Adequate implementation at teacher level is score of 2	School level: 0 (very low) = less than 65% of PLC teachers in school with score of 2 1 (low) = 65% to <75% of PLC teachers in school with score of 2 2 (moderate) = 75-85% of PLC teachers in school with score of 2 3 (high) = over 85% of PLC teachers in school with score of 2 Adequate implementation at school level is score of 2.	Sample-level 0= < 25% schools with score ≥ 2 1 = 26-50% schools with score ≥ 2 2 = 51-75% schools with score ≥ 2 3 = > 75% schools with score ≥ 2 Adequate implementation at sample level is a score of 3	All participating schools	Once per year from 2017–2018 to 2018–2019

Indicators	Definition	Unit of implem-entation	Data Source	Data Collection (who, when)	Score for levels of implementation at unit level	Threshold for adequate implementation at unit level	Roll-up to next higher level if needed (score and threshold): School level	Roll-up to program level (score and threshold for adequate implementation at sample level)	Expected sample for fidelity measure	Expected years of fidelity measurement
Amount of time spent on LDC during common planning time	PLCs expected to spend at least 60 minutes per PLC meeting where the coach joins.	School	PLC reflection form	Teacher Leader will note time spent on LDC in the same reflection form that captures attendance. Data delivered to CRESST twice per year.	0 (low) = modal* response of under 45 minutes per push-in session 1 (moderate) = modal response of 45-59 minutes per push-in session 2 (high) = modal response of 60-74 minutes per push-in session 3 (ideal) = modal response of 75-90 minutes per push-in session *if there is more than one modal response, the highest modal response will be used.	Adequate implementation at school level is score of 2		Sample level 0 = < 25% schools with score ≥ 2 1 = 26-50% schools with score ≥ 2 2 = 51-75% schools with score ≥ 2 3 = > 75% schools with score ≥ 2 Adequate implementation at sample level is a score of 3	All participating schools	Once per year from 2017−2018 to 2018−2019

Indicators	Definition	Unit of implem-entation	Data Source	Data Collection (who, when)	Score for levels of implementation at unit level	Threshold for adequate implementation at unit level	Roll-up to next higher level if needed (score and threshold): School level	Roll-up to program level (score and threshold for adequate implementation at sample level)	Expected sample for fidelity measure	Expected years of fidelity measurement
Exposure to LDC LEARN content during first instructional cycle	Coaches are expected to use Instructional Cycles in their biweekly digital push-in sessions with the PLCs.	Teacher	CoreTools Data	Users view Instructional Cycle sessions during coach push-in sessions. Data delivered to CRESST twice per year.	0 (very low) = teacher views less than 50% of sessions in the Instructional Cycle 1 (low) = teacher views between 50% and less than 60% of sessions in the Instructional Cycle 2 (moderate) teacher views between 60% and less than 70% of sessions in the Instructional Cycle 3 (high) teacher views 70% or more of sessions in the Instructional Cycle	Adequate implementation at school level is score of 2.	School level: 0 (very low) = less than 65% of PLC teachers in school with score of 2 1 (low) = 65% to <75% of PLC teachers in school with score of 2 2 (moderate) = 75-85% of PLC teachers in school with score of 2 3 (high) = over 85% of PLC teachers in school with score of 2 Adequate implementation at school level is score of 2.	Sample level 0 = < 25% schools with score ≥ 2 1 = 26-50% schools with score ≥ 2 2 = 51-75% schools with score ≥ 2 3 = > 75% schools with score ≥ 2 Adequate implementation at sample level is a score of 3	All participating schools	Once per year from 2017−2018 to 2018−2019

Indicators	Definition	Unit of implem-entation	Data Source	Data Collection (who, when)	Score for levels of implementation at unit level	Threshold for adequate implementation at unit level	Roll-up to next higher level if needed (score and threshold): School level	Roll-up to program level (score and threshold for adequate implementation at sample level)	Expected sample for fidelity measure	Expected years of fidelity measurement
Exposure to LDC LEARN content during second instructional cycle	Coaches are expected to use Instructional Cycles in their biweekly digital push-in sessions with the PLCs.	Teacher	CoreTools Data	Users view Instructional Cycle sessions during coach push-in sessions. Data delivered to CRESST twice per year.	0 (very low) = teacher views less than 50% of sessions in the Instructional Cycle 1 (low) = teacher views between 50% and less than 60% of sessions in the Instructional Cycle 2 (moderate) teacher views between 60% and less than 70% of sessions in the Instructional Cycle 3 (high) teacher views 70% or more of sessions in the Instructional Cycle	Adequate implementation at school level is score of 2.	School level: 0 (very low) = less than 65% of PLC teachers in school with score of 2 1 (low) = 65% to <75% of PLC teachers in school with score of 2 2 (moderate) = 75-85% of PLC teachers in school with score of 2 3 (high) = over 85% of PLC teachers in school with score of 2 Adequate implementation at school level is score of 2.	Sample level 0 = < 25% schools with score ≥ 2 1 = 26-50% schools with score ≥ 2 2 = 51-75% schools with score ≥ 2 3 = > 75% schools with score ≥ 2 Adequate implementation at sample level is a score of 3	All participating schools	Once per year from 2017−2018 to 2018−2019

Indicators	Definition	Unit of implem-entation	Data Source	Data Collection (who, when)	Score for levels of implementation at unit level	Threshold for adequate implementation at unit level	Roll-up to next higher level if needed (score and threshold): School level	Roll-up to program level (score and threshold for adequate implementation at sample level)	Expected sample for fidelity measure	Expected years of fidelity measurement
Perceived effectiveness of engagement in PLC on teacher competencies	Common planning time is expected to lead to teacher proficiency in 4 key competencies: identifying standards-aligned assignments, construction of quality assignment prompts, developing instructional plans, and formative assessment.	Teacher	Teacher survey	Teacher Survey asks respondents to report improvement from the beginning to the end of the year. There are 7 items covering the 4 competencies. Calculations for this measure are based on an index averaging the seven items.	0 (very low) = teacher reports that on average her abilities did not improve at all between the beginning and end of the year's work with LDC 1 (low) = teacher reports that on her abilities improved a little 2 (moderate) = teacher reports that her abilities improved moderately 3 (high) = teacher reports her abilities improved a great deal	Adequate implementation is score of 2 at teacher level	School level: 0 (very low) = less than 65% of PLC teachers in school with score of 2 1 (low) = 65% to <75% of PLC teachers in school with score of 2 2 (moderate) = 75-85% of PLC teachers in school with score of 2 3 (high) = over 85% of PLC teachers in school with score of 2 Adequate implementation at school level is score of 2.	Sample level 0 = < 25% schools with score ≥ 2 1 = 26-50% schools with score ≥ 2 2 = 51-75% schools with score ≥ 2 3 = > 75% schools with score ≥ 2 Adequate implementation at sample level is a score of 3	All participating schools	Once per year from 2016–2017 to 2018–2019
All indicators	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Sample-level for key component as a whole 1 = adequate implementation for each indicator 0 = inadequate implementation for one or more indicator Adequate implementation at sample level for key component is score of 1	All participating schools	Once per year from 2017–2018 to 2018–2019
2. Key Component = Asynchronous Support from LDC Coaches										

Indicators	Definition	Unit of implem-entation	Data Source	Data Collection (who, when)	Score for levels of implementation at unit level	Threshold for adequate implementation at unit level	Roll-up to next higher level if needed (score and threshold): School level	Roll-up to program level (score and threshold for adequate implementation at sample level)	Expected sample for fidelity measure	Expected years of fidelity measurement
Coach Comments on Modules	Coaches required to provide feedback on modules at set points in the instructional sequence: teaching task, complete module, and revised module.	Module (universe is all modules linked to LEARN tab courses)	CoreTools Analytic data	LDC.org will provide at least 2 data pulls per year of individual teacher level CoreTools data with information on teachers' interaction with the online courses and CoreTools features	0 (very low) = no coach comments 1 (low) = coach comment provided at one key point in design 2 (moderate) = coach comment provided at two key points in design 3 (high) = coach comment provided at three or more key points in design	Adequate implementation at module level is score of 2	School level: 0 (very low) = less than 65% of modules from school PLC with score of 2 1 (low) = 65-74% of modules from school PLC with score of 2 2 (moderate) = 75-85% of modules from school PLC with score of 2 3 (high) = over 85% of modules from school PLC with score of 2 Adequate implementation at school level is score of 2.	Sample-level 0 = < 25% schools with score ≥ 2 1 = 26-50% schools with score ≥ 2 2 = 51-75% schools with score ≥ 2 3 = > 75% schools with score ≥ 2 Adequate implementation at sample level is a score of 2	All participating schools	Once per year from 2017−2018 to 2018−2019
Coach Formative Peer Review on Modules	Coaches required to provide feedback on modules via Peer Review Feedback at set points in the instructional sequence: teaching task, complete module, and revised module.	Teacher (universe is all modules linked to LEARN tab courses)	CoreTools Analytic data	LDC.org will provide at least 2 data pulls per year of individual teacher level CoreTools data with information on teachers' interaction with the online courses and CoreTools features	0 (low) = coach feedback not provided on a linked course via peer review rubric at least once per year per teacher 1 (moderate) = coach feedback provided on a linked course once via peer review rubric per year per teacher	Adequate implementation at teacher level is score of 1	School level: 0 (very low) = less than 65% of teachers from school PLC with score of 1 1 (low) = 65-74% of teachers from school PLC with score of 1 2 (moderate) = 75-85% of teachers from school PLC with score of 1 3 (high) = over 85% of teachers from school PLC with score of 1 Adequate implementation at	Sample-level 0 = < 25% schools with score ≥ 2 1 = 26-50% schools with score ≥ 2 2 = 51-75% schools with score ≥ 2 3 = > 75% schools with score ≥ 2 Adequate implementation at sample level is a score of 2	All participating schools	Once per year from 2017−2018 to 2018−2019

Indicators	Definition	Unit of implem-entation	Data Source	Data Collection (who, when)	Score for levels of implementation at unit level	Threshold for adequate implementation at unit level	Roll-up to next higher level if needed (score and threshold): School level	Roll-up to program level (score and threshold for adequate implementation at sample level)	Expected sample for fidelity measure	Expected years of fidelity measurement
							school level is score of 2.			
Teacher perception of the helpfulness of coach written feedback on modules	Teacher rating of coach-provided asynchronous feedback via CoreTools between push-in sessions	Teacher	Teacher survey	Spring teacher survey administered by CRESST will ask teachers to report on whether they found written feedback via the peer review form and comments in CoreTools helpful.	0 (very low) = not helpful 1 (low) = a little helpful 2 (moderate) = moderately helpful 3 (high) = very helpful	Adequate implementation at teacher level is score of 2	School level: 0 (very low) = less than 65% of teachers in school PLC with score of 2 1 (low) = 65-74% of teachers in school PLC with score of 2 2 (moderate) = 75-85% of teachers in school PLC with score of 2 3 (high) = over 85% of teachers in school PLC with score of 2 Adequate implementation at school level is score of 2.	Sample-level 0 = < 25% schools with score ≥ 2 1 = 26-50% schools with score ≥ 2 2 = 51-75% schools with score ≥ 2 3 = > 75% schools with score ≥ 2 Adequate implementation at sample level is a score of 2	All participating schools	Once per year from 2016−2017 to 2018−2019
All indicators	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Sample-level for key component as a whole 1 = adequate implementation for each indicator 0 = inadequate implementation for one or more indicator Adequate implementation at sample level for key component is score of 1.	All participating schools	2017−2018 to 2018−2019

Indicators	Definition	Unit of implem-entation	Data Source	Data Collection (who, when)	Score for levels of implementation at unit level	Threshold for adequate implementation at unit level	Roll-up to next higher level if needed (score and threshold): School level	Roll-up to program level (score and threshold for adequate implementation at sample level)	Expected sample for fidelity measure	Expected years of fidelity measurement
3. Key Component = Teacher Implementation Activities										
Module editing	Participating teachers expected to edit at least one module in each year of implementation.	Teacher	CoreTools data	Data transmitted by LDC.org to CRESST in 2 data pulls per year	0 = no evidence of edits to task on any module 1 = edited task on at least one module 2 = edited task in at least one module and either standards OR text in at least one module 3 = edited task in at least one module and either standards OR text in at least one module, and either skills and mini-tasks or rubric in at least one module.	Adequate implementation at teacher level is score of 2	School level: 0 (very low) = less than 65% of teachers in school PLC with score of 2 1 (low) = 65% to <75% of teachers in school PLC with score of 2 2 (moderate) = 75-85% of teachers in school PLC with score of 2 3 (high) = over 85% of teachers in school PLC with score of 2 Adequate implementation at school level is score of 2.	Sample-level 0 = < 25% schools with score ≥ 2 1 = 26-50% schools with score ≥ 2 2 = 51-75% schools with score ≥ 2 3 = > 75% schools with score ≥ 2 Adequate implementation at sample level is a score of 3	All participating schools	Once per year from 2017–2018 to 2018–2019
Module implementation	Participating teachers expected to implement two modules per year and upload student work based on modules	Teacher	CoreTools data	Data transmitted by LDC.org to CRESST in 2 data pulls per year	0 (very low) = no student work samples uploaded to CoreTools 1 (low) = student work samples for 1 module uploaded 2 (moderate) = student work samples for 2 modules uploaded 3 (high) = student work samples for 3	Adequate implementation at teacher level is score of 2	0 (very low) = less than 65% of teachers in school PLC with score of 2 1 (low) = 65-74% of teachers in school PLC with score of 2 2 (moderate) = 75-85% of teachers in school PLC with score of 2	Sample-level 0 = < 25% schools with score ≥ 2 1 = 26-50% schools with score ≥ 2 2 = 51-75% schools with score ≥ 2 3 = > 75% schools with score ≥ 2	All participating schools	Once per year from 2017–2018 to 2018–2019

Indicators	Definition	Unit of implem-entation	Data Source	Data Collection (who, when)	Score for levels of implementation at unit level	Threshold for adequate implementation at unit level	Roll-up to next higher level if needed (score and threshold): School level	Roll-up to program level (score and threshold for adequate implementation at sample level)	Expected sample for fidelity measure	Expected years of fidelity measurement
					or more modules uploaded		3 (high) = over 85% of teachers in school PLC with score of 2 Adequate implementation at school level is score of 2.	Adequate implementation at sample level is a score of 3		
All indicators	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Sample-level for key component as a whole 1 = adequate implementation for each indicator 0 = inadequate implementation for one or more indicator Adequate implementation at sample level for key component is score of 1.	All participating schools	Once per year from 2017–2018 to 2018–2019
4. Key Component = Leadership Support at Different Levels										
Frequency of Coach/Teacher Leader monthly meetings	At minimum, Teacher Leaders are expected to have 30 minute planning and progress call with coach each month.	School	PLC Reflection form		0 (very low) = less than 4 planning and progress calls in the year 1 (low) = 4-8 planning and progress calls 2 (moderate) = 9-13 planning and progress calls 3 (high) = 14 or more planning and progress calls	Adequate implementation at school level is score of 2		Sample-level 0 = < 25% schools with score ≥ 2 1 = 26-50% schools with score ≥ 2 2 = 51-75% schools with score ≥ 2 3 = > 75% schools with score ≥ 2 Adequate implementation at sample level is a score of 3	All participating schools	Once per year from 2017–2018 to 2018–2019

Indicators	Definition	Unit of implem-entation	Data Source	Data Collection (who, when)	Score for levels of implementation at unit level	Threshold for adequate implementation at unit level	Roll-up to next higher level if needed (score and threshold): School level	Roll-up to program level (score and threshold for adequate implementation at sample level)	Expected sample for fidelity measure	Expected years of fidelity measurement
Administrator attendance at quarterly in-person administrator meeting	One administrator per school is expected to attend LDC's in-person administrator meetings, occurring three times during the school year.	School	LDC Attendance Records		0 (very low) = participating in no event 1 (low) = participating in 1 event 2 (moderate) = participating in 2 events 3 (high) = participating in 3-4 events	Adequate implementation at school level is score of 2		Sample-level 0 = < 25% schools with score ≥ 2 1 = 26-50% schools with score ≥ 2 2 = 51-75% schools with score ≥ 2 3 = > 75% schools with score ≥ 2 Adequate implementation at sample level is a score of 3	All participating schools	Once per year from 2017−2018 to 2018−2019
Teacher Leader attendance at quarterly in-person Teacher Leader meetings	Teacher Leader is expected to attend LDC's in-person administrator meetings, occurring three times during the school year.	School	LDC Attendance records		0 (very low) = participating in no event 1 (low) = participating in 1 event 2 (moderate) = participating in 2 events 3 (high) = participating in 3-4 events	Adequate implementation at school level is score of 2		Sample-level 0 = < 25% schools with score ≥ 2 1 = 26-50% schools with score ≥ 2 2 = 51-75% schools with score ≥ 2 3 = > 75% schools with score ≥ 2 Adequate implementation at sample level is a score of 3	All participating schools	Once per year from 2017−2018 to 2018−2019
Principal Mini-task Observation	School leaders expected to observe all LDC teachers	Teacher	Teacher survey	Data collected each Spring via CRESST survey.	0 (low) = teacher reports 0 observations by school leader	Adequate implementation at teacher level is 1	0 (very low) = less than 65% of teachers in school PLC	Sample-level 0 = < 25% schools with score ≥ 2	All participating schools	Once per year from 2016−2017 to 2018−2019

Indicators	Definition	Unit of implem-entation	Data Source	Data Collection (who, when)	Score for levels of implementation at unit level	Threshold for adequate implementation at unit level	Roll-up to next higher level if needed (score and threshold): School level	Roll-up to program level (score and threshold for adequate implementation at sample level)	Expected sample for fidelity measure	Expected years of fidelity measurement
	implementing at least one mini-task				1 (moderate) = teacher reports 1 observation by school leader 2 (high) = teacher reports 2 observations by school leader 3 (very high) = teacher reports 3 or more observations by school leader		reporting adequate implementation 1 (low) = 65% to 74% of teachers in school PLC reporting adequate implementation 2 (moderate) = 75% to 99% of teachers in school PLC reporting adequate implementation 3 (high) = 100% of teachers in school PLC reporting adequate implementation Adequate implementation at school level is score of 2.	1 = 26-50% schools with score ≥ 2 2 = 51-75% schools with score ≥ 2 3 = > 75% schools with score ≥ 2 Adequate implementation at sample level is a score of 3		
All indicators	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Sample-level for key component as a whole 1 = adequate implementation for each indicator 0 = inadequate implementation for one or more indicator	All participating schools	Once per year from 2017−2018 to 2018−2019

Appendix H:
Outcome Analysis Methodology

Analysis Model Specification

For our outcome analyses, we used a threshold of $p \leq .05$ to determine whether there was a statistically significant impact of LDC on ELA achievement. In addition to the LDC treatment indicator, a teacher effect for years of experience was included, as well as an aggregate indicator measuring the mean baseline performance of each student's classroom peers. The fixed effects also included student characteristics to identify the matched comparison sample of students, such as baseline achievement, socioeconomic status, demographics, language proficiency, grade level, and participation in special education.

The three-level MMMC model was used to estimate the impacts of the LDC intervention on student learning. The general specification for the middle school level MMMC model is shown in the following equation using similar notation proposed by Browne et al. (2001, equation 6) and applied in Tranmer et al. (2014, equation 3).

$$y_i = x_i^{'} \beta + u^{(3)}_{School(i)} \sum_{j \in Teacher(i)} w_{i,j} u_j^{(2)} + e_i$$

$$\mathrm{i} = 1, \ldots, \mathrm{n}\ \ \mathrm{Teacher(i)} \subset (1, \ldots, \mathrm{J})$$

$$u^{(3)}_{School(i)} \sim \mathrm{N}\left(0, \sigma^2_{u(2)}\right), u_j^{(2)} \sim \mathrm{N}\left(0, \sigma^2_{u(2)}\right), e_i \sim \mathrm{N}(0, \sigma_e^2)$$

In this model y_i is the student achievement score response, X_i is a vector of the fixed covariates and β is the vector of the corresponding fixed effects. $School(i)$ is the school which student i attends, thus the term $u^{(3)}_{School(i)}$ represents the random effects for that level of classification. Within the term $\sum_{j \in Teacher(i)} w_{i,j} u_j^{(2)}$, $u_j^{(2)}$ is the set of j random effects for the teachers included in the selected dataset, and $w_{i,j}$ is the weight which sums to 1 for each student applied in proportion to the instruction time assigned with each teacher. The following presents an example of the full middle school model specification.

$$\begin{aligned} achievement_i = {} & \beta_0 + LDC_i * \beta_1 + priorELA_i * \beta_2 + priorMath_i * \beta_3 + Female_i * \beta_4 + LEP_i \\ & * \beta_5 + SES_i * \beta_6 + Black_i * \beta_7 + Hispanic_i * \beta_8 * + SPED_i * \beta_9 + Gifted_i * \beta_{10} \\ & + HonorsELA_i * \beta_{11} + priorClassELA_i * \beta_{12} + TeachExp_i * \beta_{13} \\ & + TeachAttend_i * \beta_{14} + u^{(3)}_{School(i)} \sum_{j \in Teacher(i)} w_{i,j} u_j^{(2)} + e_i \end{aligned}$$

$$u^{(3)}_{School(i)} \sim \mathrm{N}\left(0, \sigma^2_{u(3)}\right), u_j^{(2)} \sim \mathrm{N}\left(0, \sigma^2_{u(2)}\right), e_i \sim \mathrm{N}(0, \sigma_e^2)$$

In this model, $achievement_i$ is the standardized ELA outcome score for student *i*; In the dosage-dependent model, LDC_i is the proportion of core class instruction time taken with an LDC teacher (range = 0–1). In the dosage-independent model LDC_i is coded as zero for comparison students and as 1 for students receiving any level of LDC teacher exposure.

- $Female_i, LEP_i, Black_i, Hispanic_i, SPED_i, Gifted_i, and\ SES_i$ are student demographic indicators coded 1 if the status is present and 0 if absent;
- $HonorsELA_i$ is dummy coded 1 when a student was enrolled in an at least one honors ELA course and otherwise as 0, allowing students who did not enroll in any honors ELA courses to serve as the reference group;
- $priorELA_i$ and $priorMath_i$ are standardized student achievement scores from the baseline year;
- $priorClassELA_i$ is the aggregated mean of the baseline ELA scores for all the core class peers of student *i*;
- $TeachExp_i$ is the aggregated percentage of the years of teaching experience less than three for those teachers that student *i* was exposed to in his/her core classes;
- $TeachAttend_i$ is the aggregated mean attendance for those teachers that student *i* was exposed to in his/her core classes;
- β_1 is the impact of LDC, the treatment;
- β_{12} is the average difference between Cohort 1 and Cohort 2;
- β_2 & β_3 are the effects of the baseline score covariates;
- β_4 … β_{10} are the effects of the demographic covariates;
- β_{11} … β_{14} are the effects of the aggregated class level covariates;
- $u^{(3)}_{School(i)}, u^{(2)}_j, e_i$ are the error components at the school, teacher, and student level respectively assumed to all have a mean of zero and a variance, $\sigma^2_{u(2)}, \sigma^2_{u(3)}, \sigma^2_e$ respectively.

Student/Teacher Course Exposure Weighting

Tables H1 and H2 demonstrate how the process of calculating general MMMC teacher weights and LDC treatment weights, for the dosage modeling approach, was conducted respectively for elementary and middle school. In elementary school, in the event that a student was exposed to more than one teacher, each content area was given equal weight in distributing teacher/student exposure. For example, if a student was enrolled for both ELA and social studies/history under one teacher, then that teacher was coded as .67 for having contributed to two thirds of the students' core curriculum exposure. If the same student enrolled in science with a different teacher than the one who was linked to their course marks in ELA and social studies/history, then that science teacher would have been coded as .33 and

all other teachers in the sample would have been coded as zero. This would then result in the student's exposure adding to a unity (1).

Table H1

Example of Elementary School Student/Teacher Weighting Based on Course Links

Marking period	Example student/teacher weighting for use in MMMC (weight = marking period/total parking period 3)	Example treatment dosage weight
One	Student enrolled with an intervention teacher: weight = (1/3) = .333	Weight = .333
Two	Student enrolled with an intervention Teacher: weight = (1/3) = .333	Weight = .333
Three	Student enrolled with a non-intervention teacher: weight = (1/3) = .333	Weight = .000
Total	Unity: for every student the student/teacher weights sum to 1	Treatment weight = .667

Note. In the selected samples for these analyses, core content courses within each marking period were taught by a single teacher.

In middle school, students' exposure to teachers at the course level in the three core content areas was coded in the same manner as in the elementary grades based on enrolled time preceding the assessment period. A difference in our middle school coding process was that we did not force each core content area into equal weighting. Instead, each core content area exposure contributed to a core content area total sum that formed the basis from which the weights were proportioned.

Most commonly, a student had equivalent core instruction exposure in each of the three content areas (often two terms each). In that scenario, if a student had exposure to three different teachers, then each teacher would contribute one third (.33) of the overall core curriculum exposure and all other teachers in the sample would be coded as zero. However, in seventh grade the students often only had one semester of science. It was also occasionally the case that students would take both a core and an additional science course; in these cases, both science courses were included in the LDC analysis.

The weighting in middle school was always distributed as a proportion of the total semesters across the three content areas. Therefore, if a student accumulated one science unit (one semester), two social studies units (two semesters), and two ELA units (two semesters), the base number of units would be five. Using that scenario, the science teacher would contribute one fifth (.20) of the overall core curriculum exposure with the social studies and science teachers contributing two fifths (.40) each, again resulting in the student's exposure adding to a unity (1). If in this scenario the ELA teacher was an intervention teacher, and if the

social studies and science teachers were not intervention teachers, the treatment dosage weight would equal 0.40 (see table H2).

Table H2

Example of Middle School Student/Teacher Weighting Based on Course Mark Links

Core content area	Course name	Example student/teacher weighting for use in MMMC (weight = subject units/total units)	Example treatment dosage weight
ELA	English 7A & 7B	Student enrolled two terms of core ELA (Grade 7) with an intervention teacher: weight = 2/5 = .400	Weight = .400
Social studies	Social Studies WHG: ANC CIV & B	Student enrolled two terms of core social studies (Grade 7) with a nonintervention teacher: weight = 2/5 = .400	Weight = .000
Science	Science 7	Student enrolled one terms of core science (Grade 7) with a nonintervention teacher: Weight = 1/5 = .200	Weight = .000
Total		Unity: for every student the student/teacher weights sum to 1	Treatment weight = .400

Calculation of Effect Size

We calculated student-level effect sizes according to the What Works Clearinghouse (WWC) 4.0 criteria. Specifically, for the impact analysis with treatment status as a dichotomous variable, we calculated Hedges' g, the difference in adjusted mean outcomes for the groups divided by the unadjusted pooled within-group standard deviation of the outcome measure in the sample, for all outcomes. The difference in adjusted mean outcomes is estimated by β_1 in the models we previously defined, as outlined in the WWC standards handbook for computing effect sizes in multi-level frameworks. Specifically,

$$g = \frac{\omega\gamma}{\sqrt{\frac{(n_i - 1)s_i^2 + (n_c - 1)s_c^2}{n_i + n_c - 2}}}$$

where γ is β_1, which is the coefficient from the MMMC for the intervention effect.

Note that in our analyses the outcome measure is standardized within the analytical sample (M = 0, SD = 1). As a result, we expect that g would likely be quite similar to the β_1 coefficient from the MMMC model in the large samples we plan to collect later in the study.

Though it is not standard to use g with a continuous treatment effect, as in the case of our dosage-dependent treatment measure, we have defined and matched populations n_i and n_c where treated students (n_i) could have any positive treatment value ≤ 1, and comparison

students (n_c) had a treatment value of zero. We could therefore calculate g in the case of our dosage-dependent treatment measure, and again expect that it would not differ substantially from the β_1 coefficient. It is crucial, however, to note that g and β_1 in the dosage-dependent models reflect the effect size projected for a student who would receive exposure to intervention teachers in all of their core classes. Along with this effect we report average dosage received by treated students so that the average treatment effect on treated students could be calculated.

Appendix I:
Outcome Analysis Tables

Table I1

Before and After Matching Sample Sizes: Cohort 2 Elementary School Analysis for Teachers With 2 Years of LDC Implementation

	LDC sample			Comparison sample		
Stage	Schools	Teachers	Students	Schools	Teachers	Students
Stage 1						
Before school matching	15	31	707	474	1,977	39,409
After school matching	15	31	707	72	309	5,677
Stage 2						
After student matching	15	31	640	71	212	640

Table I2

Before and After Matching Sample Sizes: Cohort 2 Middle School Analysis for Teachers With 2 Years of LDC Implementation

	LDC sample			Comparison sample		
Stage	Schools	Teachers	Students	Schools	Teachers	Students
Stage 1						
Before school matching	7	32	2,463	115	2,882	80,214
After school matching	7	32	2,463	35	908	24,497
Stage 2						
After student matching	7	32	2,299	33	667	2,299

Table I3

2016–2017 Baseline Characteristics of Treated Students Taught by Cohort 2 Elementary School Teachers Participating in LDC in 2 Consecutive Years and Comparison Students After Matching

Student characteristic	Treatment group (*n* = 640)	Comparison group (*n* = 640)
Race/ethnicity		
Hispanic (%)	76.4	76.4
Black (%)	6.6	6.6
Asian (%)	4.7	4.7
White (%)	10.9	10.9
Other (%)	1.4	1.4
Female (%)	49.4	47.8
Special programs status		
Free or reduced-price lunch (%)	57.2	57.2
English language learner (%)	15.8	15.8
Special education (%)	6.7	6.7
Gifted (%)	12.8	8.8
Student baseline achievement		
Mean baseline year mathematics Z score	0.147	0.158
Mean baseline year ELA Z score	0.158	0.165
Class and teacher characteristics		
Mean baseline ELA Z score of current peers	0.137	0.091
Teacher years of experience (% < 3 years)	11.3	15.1
Grade level at baseline year		
Grade 3 in 2016−2017 (%)	85.0	85.0
Grade 4 in 2016−2017 (%)	15.0	15.0

Table I4

2016–2017 Baseline Characteristics of Treated Students Taught by Cohort 2 Middle School Teachers Participating in LDC in 2 Consecutive Years and Comparison Students After Matching

Student characteristic	Treatment group (*n* = 2,299)	Comparison group (*n* = 2,299)
Race/ethnicity		
Hispanic (%)	93.4	93.4
Black (%)	3.1	3.1
Asian (%)	1.0	0.8
White (%)	1.8	1.8
Other (%)	0.7	0.9
Female (%)	51.3	51.3
Special programs status		
Free or reduced-price lunch (%)	61.2	61.4
English language learner (%)	14.8	14.8
Special education (%)	6.0	6.0
Gifted (%)	12.3	14.4
Student baseline achievement		
Mean baseline year mathematics Z score	0.037	0.024
Mean baseline year ELA Z score	-0.002	-0.011
Class and teacher characteristics		
Mean baseline ELA Z score of current peers	-0.012	-0.028
Teacher years of experience (% < 3 years)	17.5	14.4
Grade level at baseline year		
Grade 4 in 2016−2017 (%)	15.1	15.1
Grade 5 in 2016−2017 (%)	42.2	42.2
Grade 6 in 2016−2017 (%)	42.6	42.6

Table I5

Baseline Characteristics of Prior Exposure Subgroups of Treated Students Taught by Cohorts 1 and 2 Middle School and Matched Comparison Student Groups

Student characteristic	Prior and current treatment group (*n* = 1,161)	Comparison group for prior and current (*n = 1,161*)	Current only treatment group (*n* = 2,133)	Comparison group for current only (*n = 2,133*)
Race/ethnicity				
Hispanic (%)	95.9	95.9	94.0	94.0
Black (%)	3.0	3.0	2.5	2.5
Asian (%)	0.3	0.2	1.0	0.8
White (%)	0.5	0.4	1.8	1.8
Other (%)	0.3	0.5	0.7	0.9
Female (%)	51.9	51.9	50.4	50.4
Special programs status				
Free or reduced-price lunch (%)	69.4	69.0	72.8	72.0
English language learner (%)	18.5	18.5	19.6	19.6
Special education (%)	7.5	7.4	7.9	9.0
Gifted (%)	14.8	18.7	10.5	11.2
Student baseline achievement				
Mean baseline year mathematics Z score	0.040	0.025	-0.100	-0.092
Mean baseline year ELA Z score	-0.019	0.038	-0.132	-0.132
Class and teacher characteristics				
Mean baseline ELA Z score of current peers	-0.054	-0.056	-0.127	-0.121
Teacher years of experience (<=3)	18.8	14.3	13.6	12.2
Grade level at baseline year				
In Grade 4 (%)	1.7	1.7	18.4	18.4
In Grade 5 (%)	28.9	28.9	57.0	57.0
In Grade 6 (%)	69.3	69.3	24.6	24.6

Table I6

Baseline Characteristics of Current Year Dosage Subgroups of Treated Students Taught by Cohorts 1 and 2 Middle School and Matched Comparison Student Groups

Student characteristic	High dosage treatment group (*n* = 1,014)	Comparison group for high dosage (*n = 1,014*)	Low dosage treatment group (*n* = 2,280)	Comparison group for low dosage (*n = 2,280*)
Race/ethnicity				
Hispanic (%)	95.6	95.6	94.3	94.3
Black (%)	3.1	3.1	2.5	2.5
Asian (%)	0.1	0.3	0.7	1.0
White (%)	0.7	0.5	1.7	1.7
Other (%)	0.5	0.5	0.8	0.5
Female (%)	49.5	49.5	51.6	51.6
Special programs status				
Free or reduced-price lunch (%)	78.8	78.6	68.4	67.5
English language learner (%)	25.3	25.3	16.5	16.5
Special education (%)	10.4	10.5	6.6	7.5
Gifted (%)	12.4	12.4	11.8	14.5
Student baseline achievement				
Mean baseline year mathematics Z score	-0.102	-0.126	-0.028	-0.017
Mean baseline year ELA Z score	-0.133	-0.151	-0.074	-0.075
Class and teacher characteristics				
Mean baseline ELA Z score of current peers	-0.159	-0.124	-0.075	-0.086
Teacher years of experience (<=3)	17.7	15.3	14.4	12.4
Grade level at baseline year				
In Grade 4 (%)	16.6	16.6	10.7	10.7
In Grade 5 (%)	59.3	59.3	41.7	41.7
In Grade 6 (%)	24.2	24.2	47.5	47.5

Table I7

Effect Estimates of Cohorts 1 and 2 Middle School Teachers Participating in LDC in 2 Consecutive Years on Smarter Balanced ELA Performance, Dosage-Dependent Prior Year Subgroups Model

Variables	Dosage-dependent subgroup model coefficient *(SD)*
Prior and current treatment (*n* = 1,161)	0.143 (0.057)*
Control for prior and current (*n* = 1,161)	0.041 (0.026)
Current only treatment (*n* = 2,133)	0.098 (0.055)
Control for current only (*n* = 2,133)	Reference Group in Model
Level 1 student characteristics	
Hispanic	-0.202 (0.047)*
Black	-0.374 (0.064)*
Free or reduced-price lunch	-0.050 (0.017)*
Female	0.179 (0.014)*
English language learner	-0.133 (0.022)*
Special education	0.035 (0.030)
Gifted	0.046 (0.024)*
Honors English	0.130 (0.036)*
Teacher experience	-0.032 (0.057)
Baseline peer ELA Z score	0.180 (0.037)*
Baseline year mathematics Z score	0.200 (0.013)*
Baseline year ELA Z score	0.533 (0.014)*
In Grade 4 baseline	0.037 (0.041)
In Grade 5 baseline	-0.052 (0.025)*
In Cohort 2 schools	0.011 (0.029)

Table I8

Effect Estimates of Cohorts 1 and 2 Middle School Teachers Participating in LDC in 2 Consecutive Years on Smarter Balanced ELA Performance, Dosage-Dependent Current Year Dosage Subgroups Model

Variables	Dosage-dependent subgroup model coefficient *(SD)*
LDC teacher treatment high dosage (*n* = 1014)	0.174 (0.062)*
Control for high dosage (*n* = 1014)	0.032 (0.029)
LDC teacher treatment low dosage (*n* = 2280)	0.075 (0.057)
Control for low dosage (*n* = 2280)	Reference Group in Model
Level 1 student characteristics	
Hispanic	-0.202 (0.047)*
Black	-0.373 (0.064)*
Free or reduced-price lunch	-0.050 (0.017)*
Female	0.181 (0.013)*
English language learner	-0.131 (0.021)*
Special education	0.034 (0.030)
Gifted	0.046 (0.024)*
Honors English	0.135 (0.036)*
Teacher experience	-0.030 (0.057)
Baseline peer ELA Z score	0.179 (0.037)*
Baseline year mathematics Z score	0.200 (0.013)*
Baseline year ELA Z score	0.533 (0.014)*
In Grade 4 baseline	0.002 (0.041)
In Grade 5 baseline	-0.099 (0.025)*
In Cohort 2 schools	0.023 (0.030)

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