

Fresno Unified, the Futures Challenge, and 21C Learning Design

Fresno Personalized Learning Initiative: Year 1 Report

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Our education systems need to quickly and more radically shift to close equity gaps and to better prepare our youth for “as yet imagined” futures.

The moral imperative shared by many educators is having students better prepared for learning, work, life and citizenship in a world that is rapidly changing, highly interconnected, and immersed in technology. Dynamic futures require individuals who continuously lead their own learning and who can innovatively solve real-world problems in their communities and in the broader world. If our students are to thrive beyond school, they will need evidence of their creative, social, collaborative, analytical and digital competencies.

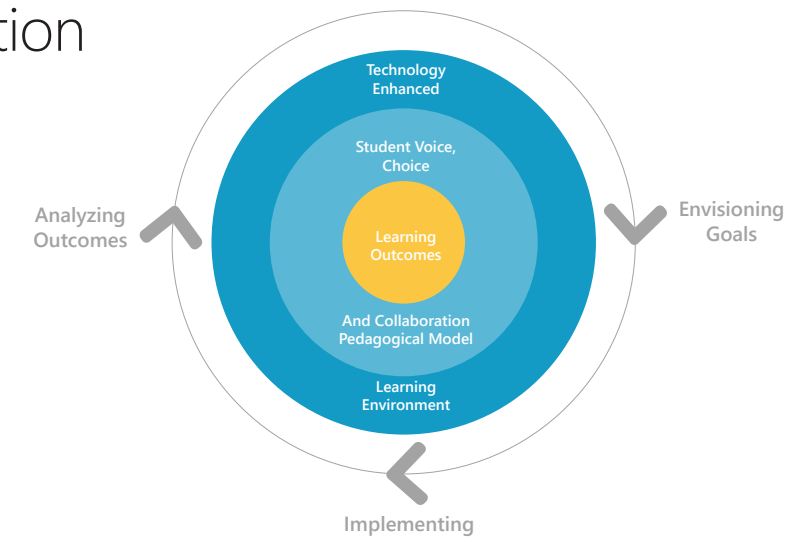
Fresno Unified, like many schools and systems across the country, has embarked on a transformation journey to meet this imperative through our Personalized Learning Initiative. We are seeking to equip all our students with the advantages of what we call “future competencies.” Students in high poverty schools or districts in the US do not always have opportunities to explicitly develop these competencies¹. In Fresno Unified, we are aligning our resources, developing deep partnerships and harnessing our collective will

to address this, the new equity gap, and ensure every student has rich learning experiences that will launch them towards thriving futures.

At the heart of Fresno’s Personalized Learning Initiative (PLI) is a pedagogical model centered on student voice, choice and collaboration. Our district calls for everyone to be involved in 1) collaborative learning cycles moving towards this model, 2) leveraging technology more consistently and intentionally, and 3) continuously analyzing and reflecting upon our collective progress.

The PLI Theory of Action

Collaborative Learning
Cycles, Continuously Improving



In Year 1, the first PLI learning cycle, we have learned:

1. The transformation of teaching practices has been ignited across the whole district, though there is still a long way to go towards system-wide change. Teachers in the PLI are adapting their practices, and the shifts are apparent at scale. Importantly, the first cohort of 220 PLI teachers is taking ownership of their own learning and leading collaborative, job-embedded development within their schools. These teachers are collaborating and are becoming mentors to the next generation of teachers joining the initiative.
2. The transformation of teaching is already having an impact on students’ future competencies in PLI classrooms. We see clear acceleration of PLI students’ use of technology, and digital collaboration. We see higher socio-emotional competencies like self-efficacy and self-management in these classrooms. We also see significant signals

of improvement in academic outcomes among PLI students, particularly in middle schools where PLI students have over 25% higher odds of meeting or exceeding standards in ELA and Math based on Spring interim assessments, compared to non PLI students. And, finally, we see that when students collaborate digitally, that collaboration is related to higher academic and socio-emotional outcomes.

3. These shifts in teaching practices and student outcomes are not spreading quickly enough to meet the larger imperative. We need to invest significantly to expand the PLI to more teachers, to go deeper within schools, and to extend the pedagogical model to more explicitly develop evidence of students’ future competencies. Finally, we need to incorporate continuous data analysis to drive rapid cycles of improvement, as this report initiates.

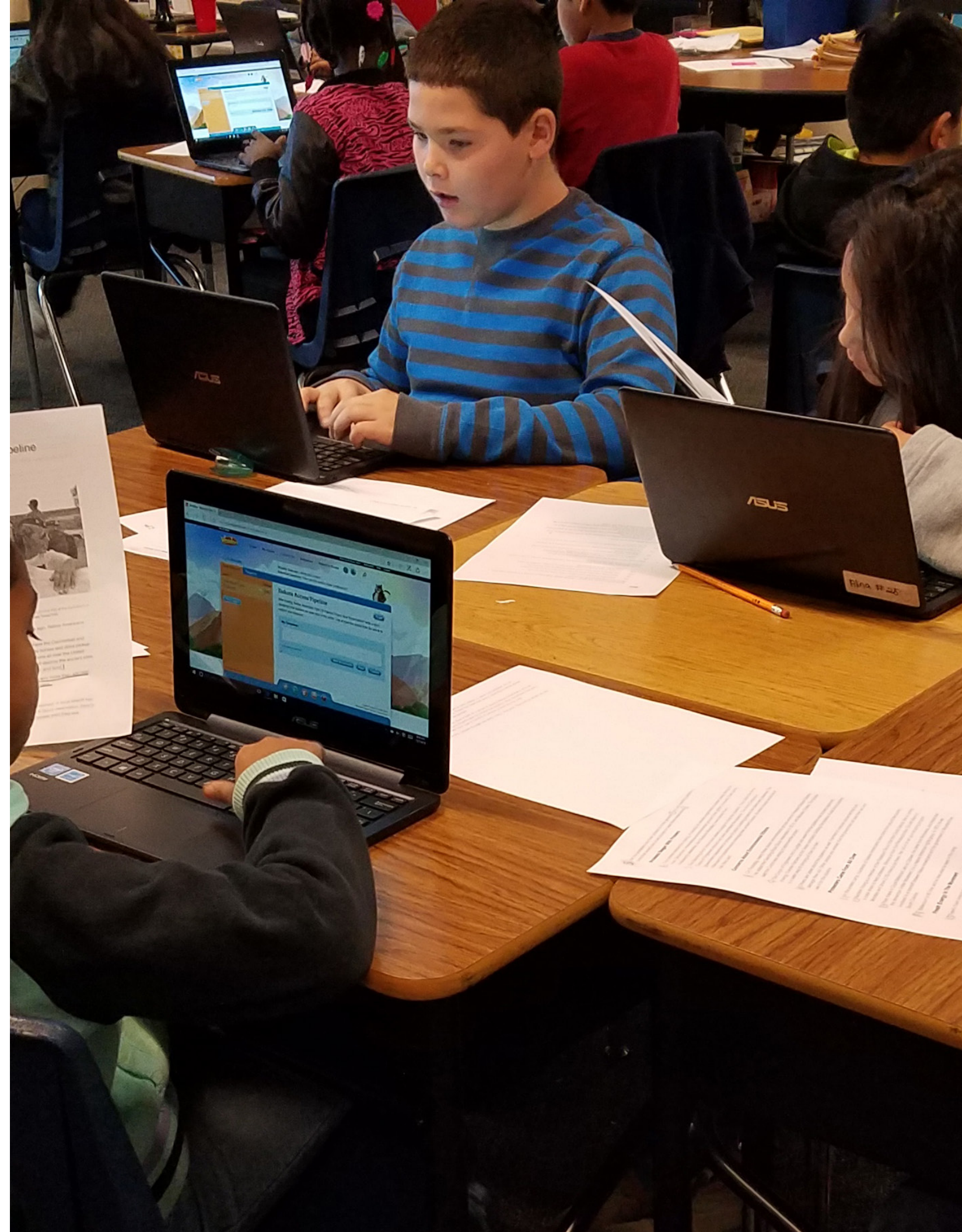
Using data for learning cycles

This report represents the beginning of our commitment to using data and analytics to drive continuous improvement. Through a partnership between Fresno Unified School District, Microsoft, and California State University, Fresno, we have developed an integrated data model and mixed research methods to make teaching and learning progress visible. Microsoft's Education Solutions Team and data science teams from across the company have integrated district data sources with data on student and teacher technology use and learning outcome data. This unique data model will be used in coming years to conduct network analysis, machine learning, and predictive analytics as part of our partnership.

We will soon be adding additional data from:

- Smarter Balanced Assessments
- Houghton Mifflin Harcourt (joining our analytics partnership this summer)
- Learning tasks designed by PLI teachers, aligned to 21st Century Learning Design rubricsⁱⁱ
- Student work represented in digital portfolios

The PLI data model provides diverse data signals for exploring how teaching and learning patterns among teachers and students in the PLI are emerging, and how those patterns differ from those not in the PLI. This report includes initial analyses from the data model and qualitative insights based on focus groups with students and teachers conducted by Fresno State.



What are the elements of Fresno's PLI?

Fresno is the 4th largest district in California, serving 75,000 students, of whom 78% are low income and 22% are learning English. In other words, Fresno Unified represents some of our country's most economically disadvantaged students. In 2016, we recognized an opportunity to better prepare students with the competencies needed to thrive in the creative, collaborative, digitally-infused futures that await them. We studied different innovations underway in education, ranging from student-centered to socio-emotional and competency-based approaches. There is growing evidence that these types of approaches, which

require high quality instructional practices, can have a significant impact on learning outcomesⁱⁱⁱ, especially where there are changes in teacher mindsets. The PLI was born as a synthesis of many of these approaches. It focuses on 1) developing all students' competencies for work, learning and life; 2) supporting deeper learning experiences that enable greater student voice, choice and collaboration; and 3) meaningfully integrating technology in teaching and learning.

Launched with 220 teachers distributed evenly across 89 different schools in the district, the PLI touched over 12,000 students this past academic year, and is set to expand each year through 2021. We sent an open invitation to teachers to apply, and among those who applied, the selection of participants was a randomized lottery. Our analysis shows that the profile of PLI teachers and students broadly match those of teachers and students in Fresno who are not in the initiativeⁱⁱⁱ.

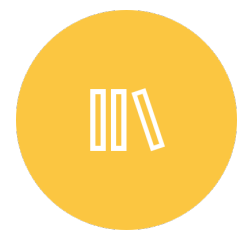
teacher voice and choice, and deep opportunities for collaboration in both physical and digital spaces. Our PLI approach also aligns with ongoing Fresno Unified professional learning work led by the Chief Academic Officer, the Instructional Division, and School Leadership that centers on high quality, standards-based instruction.

PLI professional learning provides teachers with strategies, and more importantly, experiences, that mirror those of students in a PLI classroom. By having teachers realize that there are several more levels to technology integration, beyond substitution, a big shift in teaching practices started to occur^{vi}. Our PLI teachers became more open to ideas about how to integrate technology in a way that cultivates student voice, choice, and collaboration. They learned together and committed to taking their experiences not only into their classrooms, but sharing them with colleagues. Many take-aways and growth opportunities surfaced throughout this first year's learning cycle, including a necessary shift toward a more job-embedded approach going forward. This intentional design of PLI professional learning motivated the first year's cohort of PLI teachers to put their learning into practice with their students.

The core implementation elements of the initiative include:

- A pedagogical model that focuses on student voice, choice and collaboration
- Up to 20 hours of PLI formal professional learning
- Membership in online and site-based PLI learning communities
- Devices and digital tools for every student in classrooms of PLI teachers
- Additional technology training and tech support from the districtⁱ.

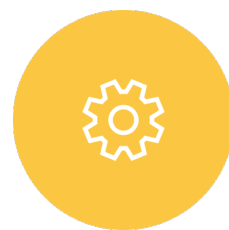
The PLI is not fundamentally about technology: our pedagogical model is the core. Early on, we recognized that to support shifts in teaching practice, the design of professional learning must provide a learning space for teachers of high expectations,



Strong Academic Foundation



Adaptable & Productive Problem Solver



Creative & Adaptive Learner



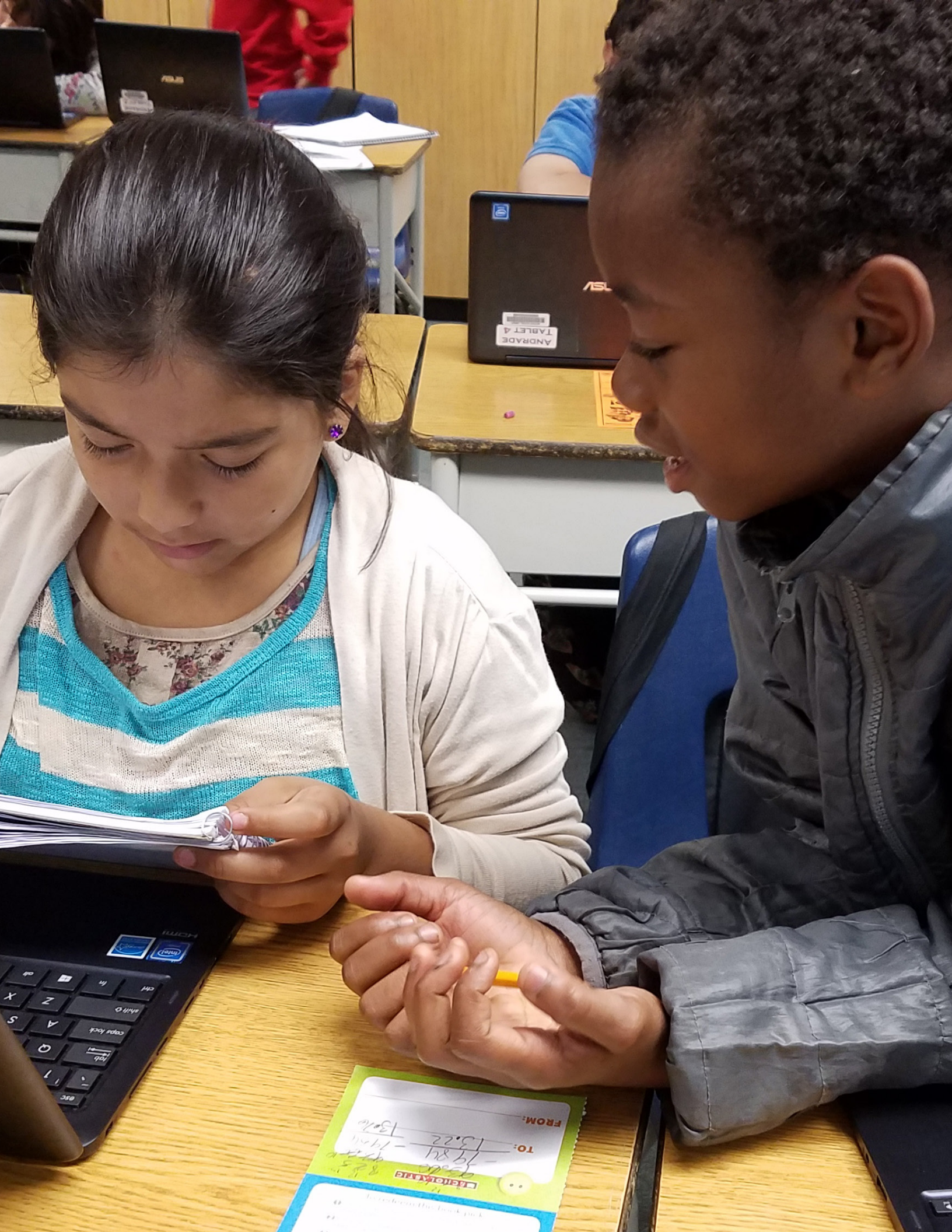
Responsible & Ethical Decision Maker



Skilled Communicator & Collaborator



Digitally Literate Citizen



What we learned in the first year's learning cycle

While many goals of the PLI are still nascent, early signals from the first year of implementation show a story of significant progress. We are at the beginning of a collaborative multi-year journey, and we are sharing our learning at this early stage as a contribution to the national conversation around education transformation.

PLI Starts with the Pedagogical Model

The PLI has ignited the transformation of teaching practices in schools across the district, though implementation is still shallow within schools in this first year of implementation, with 2 to 3 teachers per school in the first year's cohort of PLI teachers. Walking through PLI classrooms, one sees students using technology to design cars using physics, to explore careers in science, to measure their own heart rates, and to make video "talk shows" playing characters from literature. Before the PLI, most Fresno students – especially those in elementary and middle schools – were using technology primarily to take standardized high stakes assessments. Using technology instead to support the pedagogical model, PLI teachers say their students are now beginning to proactively manage their own learning:

"Now that students have computers on their table, they can help each other, look at others' screens when they are blocked, and share. I hear a lot more of 'let me show you', and students ask more questions to each other and become proactive. They are really looking for answers, and for that, they are not necessarily coming to me anymore."

-Fresno PLI Teacher

In a survey^{vii} of teachers participating in the PLI's first year, teachers reported on their use of teaching practices that develop students' future competencies. Based on teachers' descriptions and self-reporting in the survey, the most frequently implemented PLI teaching practice this past year was student collaboration, while the least frequently implemented practice was extending the classroom community. Extending the classroom community asks teachers if students are required to solve real world problems in their communities or in the broader world, or if the students present their work to audiences outside the classroom. As the PLI expands in its second year of implementation, we will be focusing on more intentionally designing learning tasks to develop students' future competencies through the "21st Century Learning Design" program^{viii}.

Technology Used to Support the Pedagogical Model

PLI teachers are using technology more intentionally to provide feedback to their students. In focus groups with PLI teachers, one of the most immediate impacts they describe is how the PLI framework enables them to use technology to provide rapid student feedback.

“The loop to feedback is so much faster.”
-Fresno PLI Teacher

“The feedback aspects have been incredible. When I stand at the front of class and say it live, there are lots of problems with the ‘talking teacher.’ If I can spend time with them online while they’re writing, it affects change in real time. The tone of the classroom is relaxed, constructive, and allows kids to really hear the feedback in a new way. I talk less, but give more feedback. And it’s working.”

-Fresno PLI Teacher

“On the same evening that the online activity is getting accomplished, I can review the content and target those students who have more difficulties and will need verbal feedback. Then I can reach out to them by the following day.”

-Fresno PLI Teacher

Technology is allowing these teachers to gauge students’ progress in the moment, and then adjust teaching to meet students where they are at. Microsoft Classroom and Microsoft Forms are some of the primary tools our teachers are using to enable this rapid feedback cycle. Microsoft Classroom is a platform for teachers and students to digitalize the assignment workflow.

“If I’m using Classroom and they know the assignment is there, some days at the beginning of class 6 kids have already done the assignment.”

-Fresno PLI Teacher

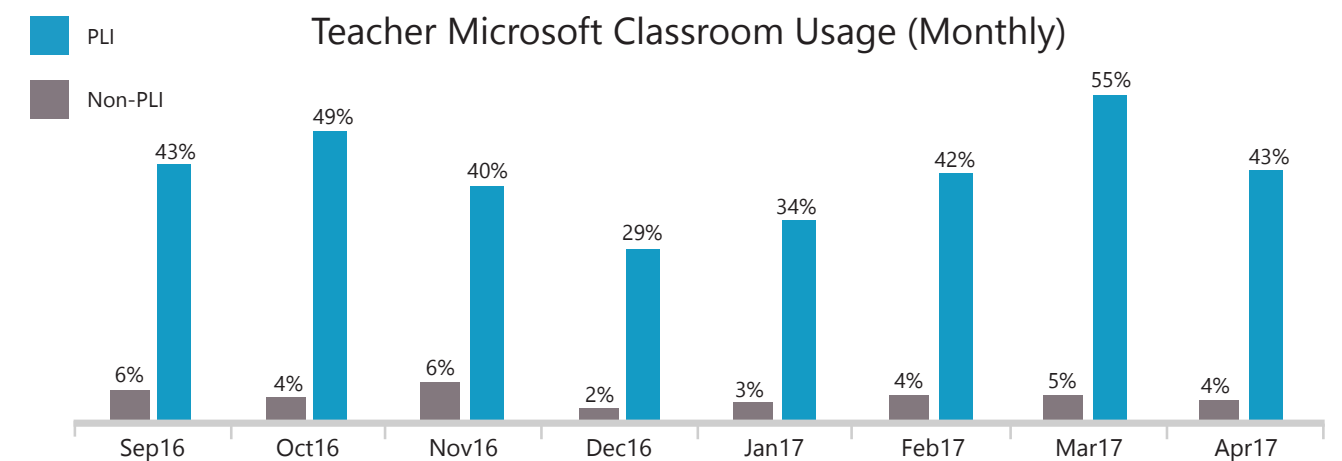
Microsoft Forms, which allows teachers to conduct rapid formative assessments and inquiries with students online, is being used in a wide variety of ways, from “daily warm ups” assessing students’ moods at the beginning of each class, to using quick quizzes to assess what students already know on a subject, to structured assessments where Forms can provide immediate feedback on wrong answers.

We can see from our data model that PLI teachers are using these technologies significantly more than non PLI teachers across the district. While 40 to 50% of PLI teachers are using Classroom in most months, only 6% or fewer non-PLI teachers are using Classroom.

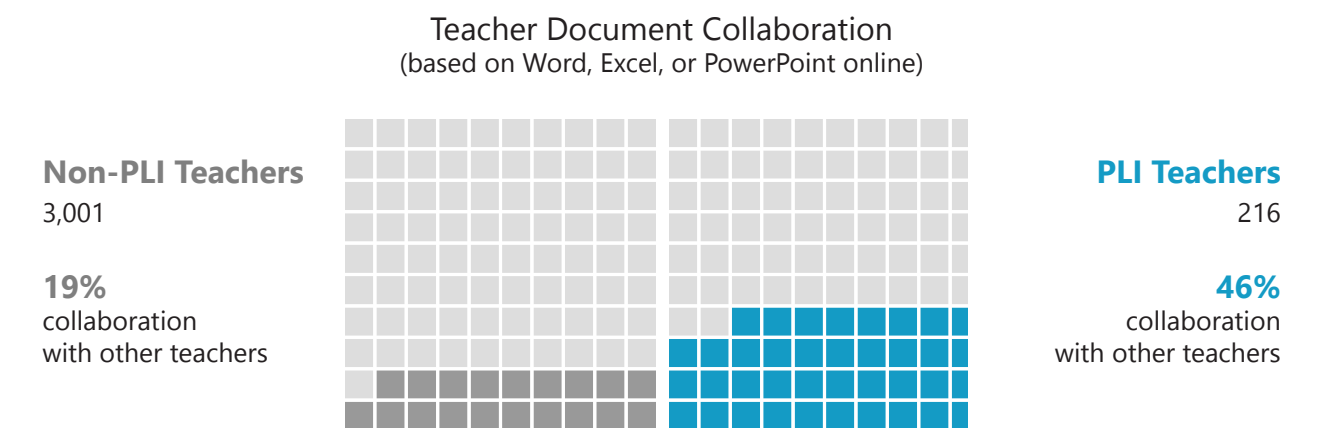
Our data also shows that PLI teachers are collaborating online significantly more than their Non-PLI peers, one indicator of their broader collaboration. The chart below shows the average monthly collaboration on documents between teachers on Microsoft Word, Excel or PowerPoint online.

These shifts in teaching practices and teachers’ collaboration are having an impact on PLI students,

as we will see in the data below. PLI teachers are using digital tools to creatively design their learning activities. They are plugging together apps, content, and assessments in a wide variety of ways that offer their students new modalities for learning. Pedagogical shifts are primary, and when these are combined with the intentional use of technology, learning outcomes are beginning to surface.



Source: Based on Fresno Unified Teacher use of Microsoft Classroom.



Source: Teacher to teacher collaboration on Microsoft Word, Excel or PowerPoint online documents. Based on an average over four 28-day time windows, from January to April 2017.

Growth in Students' Future Competencies

The PLI theory of action explicitly focuses on students' development of the kinds of competencies that are needed for life and career success – collaboration, digital, self-efficacy and self-management. Such competencies are increasingly acknowledged as a necessary ingredient for students' future success beyond school^x. But it is also broadly acknowledged that such competencies are hard to measure. Our PLI data and partnership with Microsoft is allows us to begin to develop innovative new measures of competencies, and we plan to expand these in coming years. Our early work shown in this report provides measures of the relationships between student technology engagement, digital collaboration, self-efficacy and other measures of socio-emotional learning.

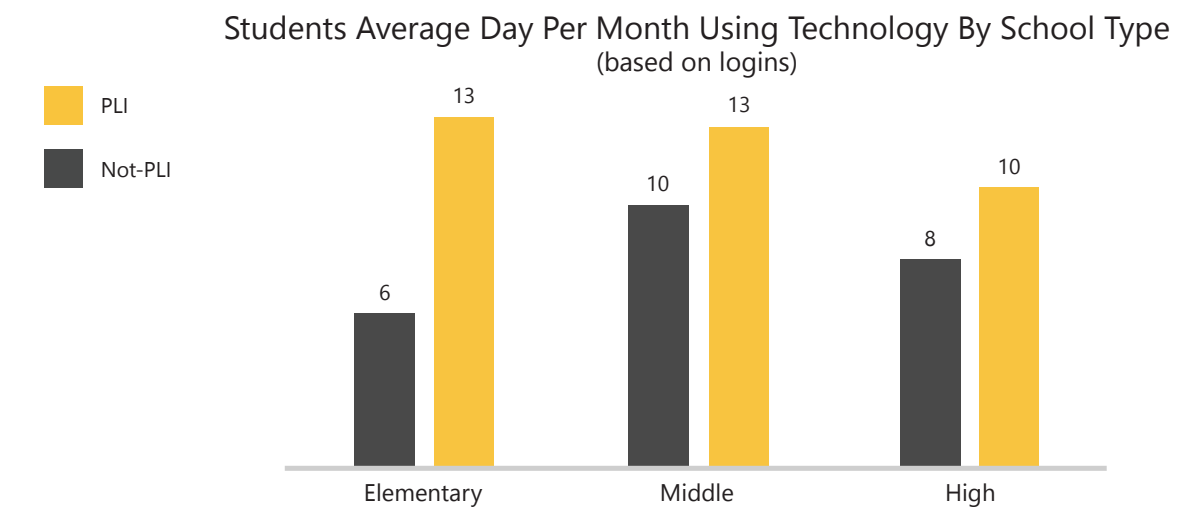
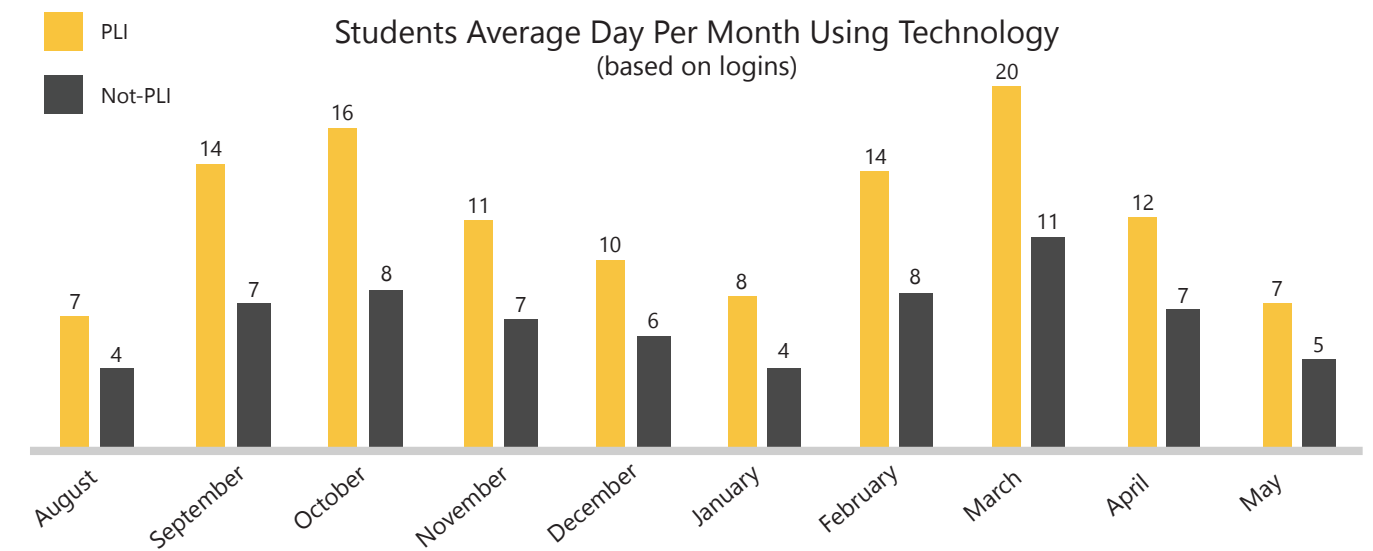
Technology Engagement

Given that the PLI enables every student in a PLI class to have a device as well as digital tools and online curriculum materials, we expected that PLI students would use technology significantly more than peers not in PLI classes. Fresno, like almost all US districts, has had technology in classrooms for decades, but its use has been varied, and too often, minimal. Outside of the PLI, students' access to educational technology varies across the district by 1) ratio of computers to students, 2) age of computers, and most importantly 3) access and use. In previous years, Smarter Bal-

anced state tests led to growth in student computers to support assessments. Some teachers negotiated the occasional access to partial class sets and leveraged these assets with high quality instruction that effectively used technology. However, most teachers didn't have a full class set or the time or proficiency to fully leverage technology in the classroom. In this diverse access landscape, we note up front that our comparisons below between students in the PLI and those not in the PLI do not fully recognize variations in student access to technology. (Next year, we will be able to compare schools that have 1:1 student computer ratio, but don't have PLI-like practices versus PLI partner schools where teachers are implementing PLI teaching practices.)

Below, we see one of the broadest measures of technology use by students across the district, device logins. Any student using any application on a Fresno Unified device or an application on the Fresno system is accounted for through this measure.

We see that students in the PLI used technology almost every school day of the month in March. We also see that PLI elementary school students are using technology on average as much as PLI middle school students, and more than high school students. If level of tech use is an indicator of digital competency, students in the PLI are already gaining a significant advantage.



Source: Based on Fresno Unified Student use of any technology, based on student logons to devices, 2016-17.

Student Digital Collaboration

One of the most interesting patterns in our PLI data is digital collaboration. Increasing student collaboration is often seen as the starting point for transforming teaching and learning practices. Collaboration is believed to engage students more deeply in the learning, and it also develops the future competency of collaboration. Many studies show that employers today value collaboration skills as a key component in hiring decisions^{xi} and California's CORE districts, of which Fresno is a member, have outlined it as an important focus area.^{xii} Digital collaboration is of

course only one form of overall collaboration, but it can potentially be a valuable indicator of this skill^{xiii}.

Our Fresno PLI data allows us to look at students' digital collaboration based on two or more students working together on a Microsoft Word, Excel or PowerPoint file, and students collaborating with teachers on files. On these measures, students in the PLI demonstrate significantly higher levels of digital collaboration (6% Non-PLI, 38% PLI).

In focus groups, students in the PLI described how this digital collaboration is influencing their learning:

"I really like hearing other people's opinions and solving problems together. I get a better understanding of what I'm learning when working with other people."

-Fresno PLI Student

"We fix each other's work if we get it wrong."

-Fresno PLI Student

"The person in your group can help you... if they see something wrong, they can go in and fix it."

-Fresno PLI Student

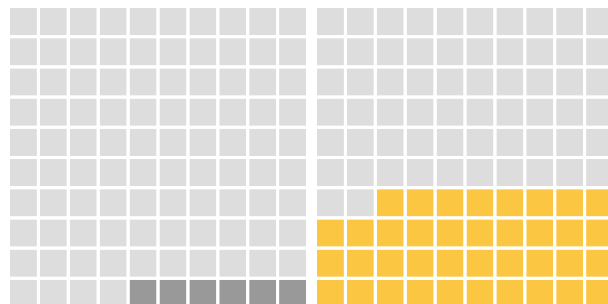
Not only are PLI students collaborating digitally more overall, their collaboration networks are much denser, meaning they are collaborating with their peers more frequently. In the diagram below, PLI students are represented in gold and Non-PLI students in grey. In March, the PLI student network was 10 times denser than non PLI students' network.

Student Document Collaboration
(based on Word, Excel, or PowerPoint online)

Non-PLI Students

61,439

6%
collaborating



PLI Students

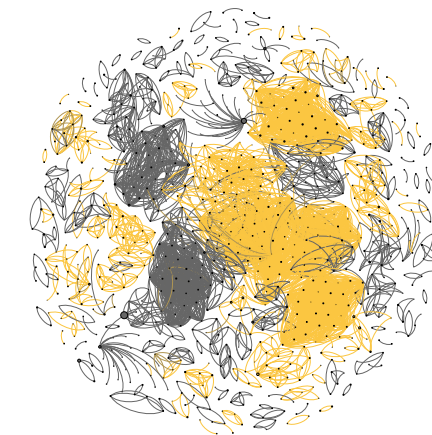
12,470

38%
collaborating

Source: Student to student document collaboration in Microsoft Word, Excel or PowerPoint online. Based on an average over four 28-day time windows, from January to April 2017.

Elementary Students: Collaboration Networks

(Based on Word, Excel, or PowerPoint file Collaboration, March 2017)



- PLI students collaborating (1281 nodes)
- Non-PLI students collaborating (1799 nodes)
- PLI to PLI student link (n= 2742, link prevalence=64%)
- Non-PLI to Non-PLI student link (n=1484, link prevalence=34%)
- PLI / Non-PLI student link (n=72, link prevalence=2%)

Source: Student to student document collaboration in Microsoft Word, Excel or PowerPoint online. The size of the node is associated with the student's online collaboration network influence during a 28-day window ending on the last day of March 2017.

Inclusion, Participation, and Self-Efficacy

Other important dimensions of students' future competencies include students' development of self-management, social awareness, self-efficacy and growth mindsets, often called 'socio-emotional learning.' Our PLI teachers consistently described elements of these competencies as important outcomes of their implementation of the PLI. Specifically, they said the PLI enables students who often face challenges of inclusion, such as Special Education and English Language Learners, to participate in more social learning:

"I had students collaborate on making and peer-assessing PowerPoints. Every time we do this, there is an extremely high level of engagement. One class with 60% SPED (Special Education) – they were the most engaged... They make more progress than any other group. SPED students are able to explore in a different way with technology."

-Fresno PLI Teacher

"A couple of ELD [English Language Development] kids, they got in front of the camera and had personality. It was the first time I had heard their voices in the classroom."

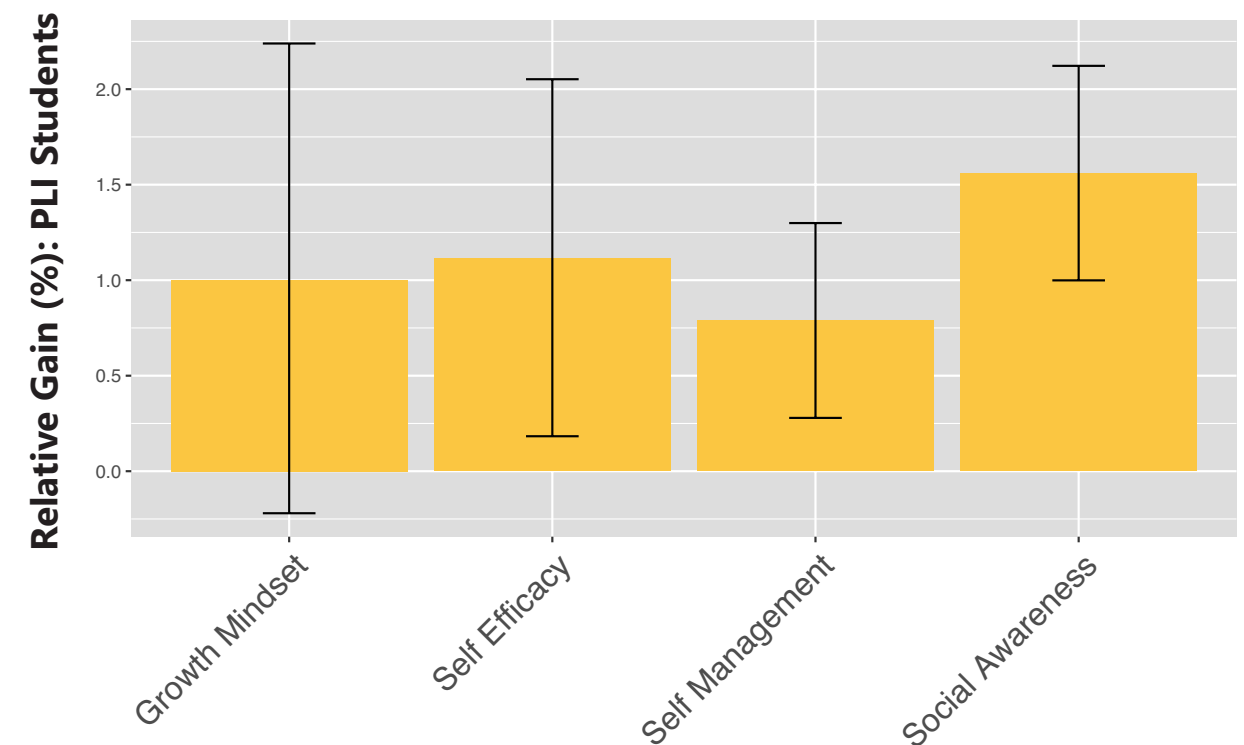
-Fresno PLI Teacher

The CORE districts in California (<http://coredistricts.org/>) began implementing measures of socio-emotional learning (SEL) through student and teacher surveys 3 years ago. Our PLI analytics allows us to use this data to see the extent to which these teachers' insights represent trends across the whole PLI. Are students participating in the PLI reporting higher levels of SEL? Our analysis found no significant differences in the overall levels of socio-emotional learning (SEL) competencies reported by PLI and Non-PLI students.

However, when we looked more closely at patterns within the PLI only, we saw differences in students' reports of SEL competencies in relation to the degree of collaboration PLI teachers designed into learning tasks. In the PLI Teacher Survey, teachers were asked how frequently they had their students collaborate in their learning. In classes where teachers asked their

students to collaborate more frequently, we see small but statistically significant higher PLI student reports on some socio-emotional competencies. The chart below shows the fully adjusted association between collaborative learning tasks and students' reports of SEL competencies.

PLI Teaching Practices: Frequency of Student Collaboration



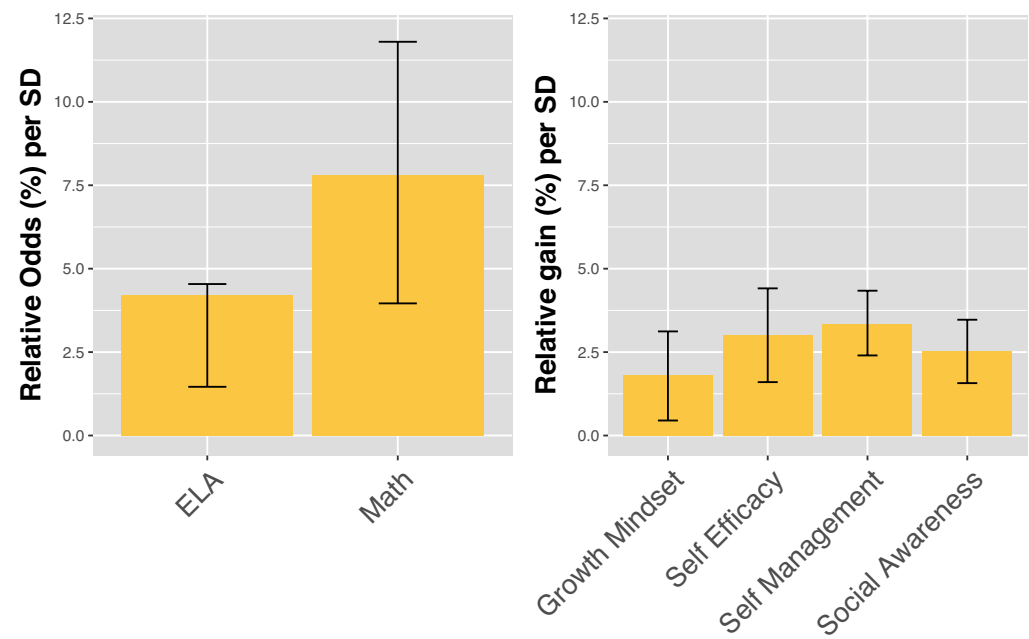
Source: CORE District Socio-Emotional Learning Survey, 2017, and PLI Teacher Survey (PLI Teaching Practices), Fresno Unified. The measure of association is the relative change between higher and lower learning collaboration, and the thin lines running through the bars represent confidence intervals. This analysis adjusts for student attendance, ethnicity, gender, grade, homelessness, special education status, low income status, language learning status and school climate.

The above chart shows that the relationship between collaborative learning tasks and higher SEL are statistically significant for Self-Efficacy, Self-Management and Social Awareness.

We found further evidence of the relationship between collaboration and learning outcomes through looking

specifically at digital collaboration. We looked at how students across the whole district were digitally collaborating (not a comparison of PLI and Non-PLI). Across the entire district, students' level of digital collaboration has a positive and statistically significant relationship with both academic outcomes (based on Spring Interim Assessments) and socio-emotional learning.

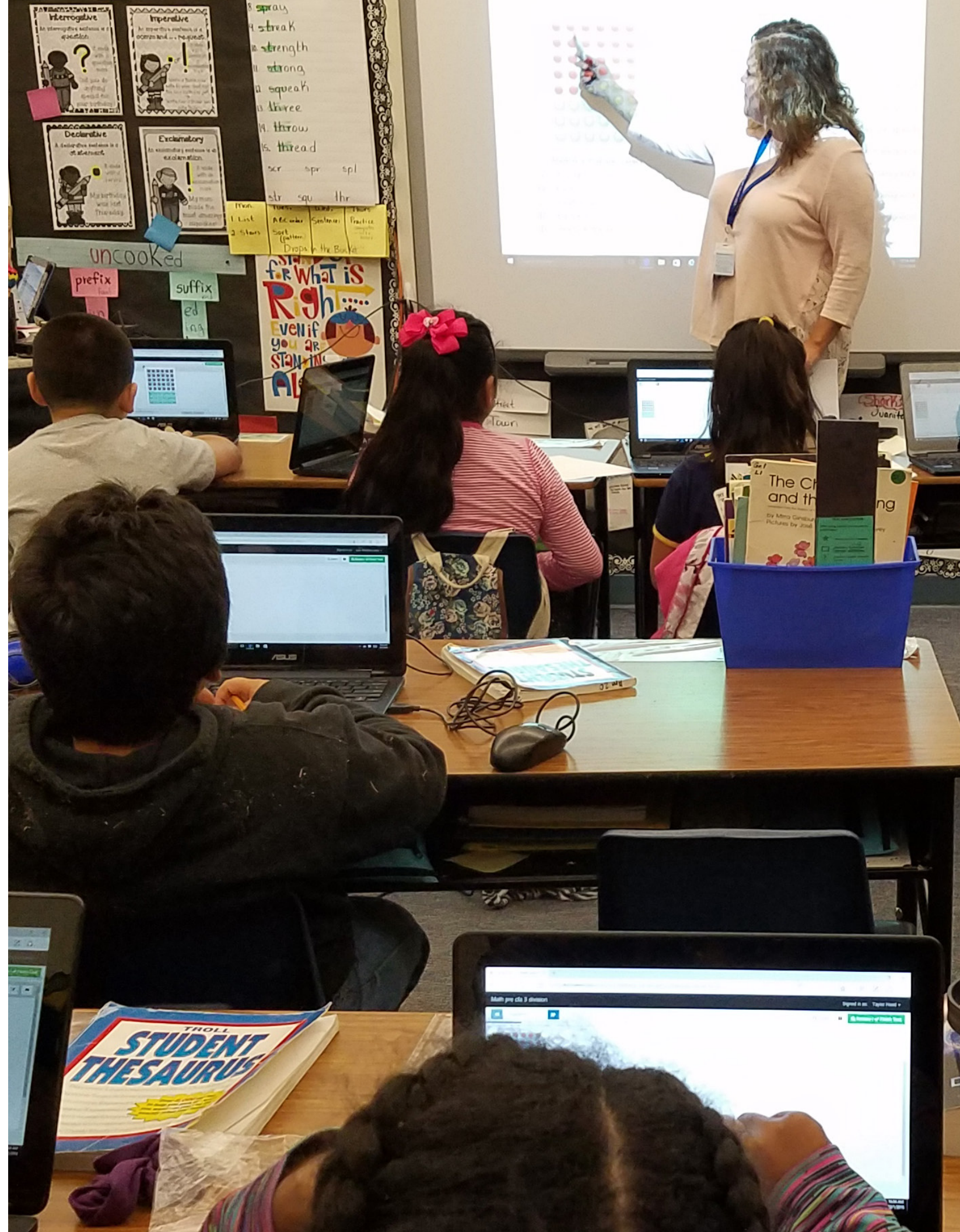
Digital Collaboration and Learning Outcomes (All Students)



Sources: Digital Collaboration data based on student Microsoft Word, Excel or PowerPoint Online Collaboration; ELA and Math data based on Spring Interim Common Assessments 2017; SEL data based on School Climate Survey, 2017, Fresno Unified. Analyses adjust for student attendance, ethnicity, gender, grade, homelessness, special education status, low income status, language learning status and school climate. The measures of association are the relative odds (left) and relative gain (right) between higher digital collaboration and learning outcomes.

The charts above show the fully adjusted association between:

1. Left: students' digital collaboration and academic outcomes (ELA and Math, based on Spring Interim Assessments)
2. Right: students' digital collaboration and their reports of SEL competencies.



Academic Acceleration

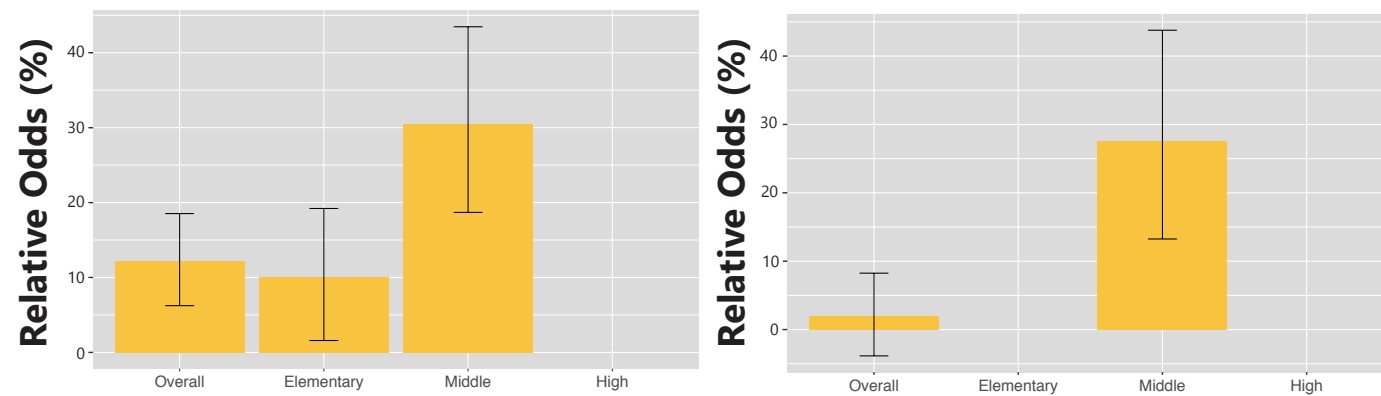
One of the challenges of projects like the PLI is that when teachers introduce new practices into the classroom, there is often a dip in assessment scores as teachers learn how to implement new practices. We expected that year one of the PLI would result in lower test scores. We were delightfully surprised to see that our expectations of a dip were not met, at least for district-wide Spring interim assessments in ELA and Math. In the first year's implementation, students overall in PLI had 12.21% higher odds in ELA of meeting or exceeding standard and 2.02% higher odds in Math of meeting or exceeding standard (Math differences were not statistically significant).

The charts here show the relative gain of PLI students compared with Non-PLI students. These gains are the highest among middle school students, and for elementary students in ELA. At the high school level, no gains are statistically significant (and are therefore not shown).

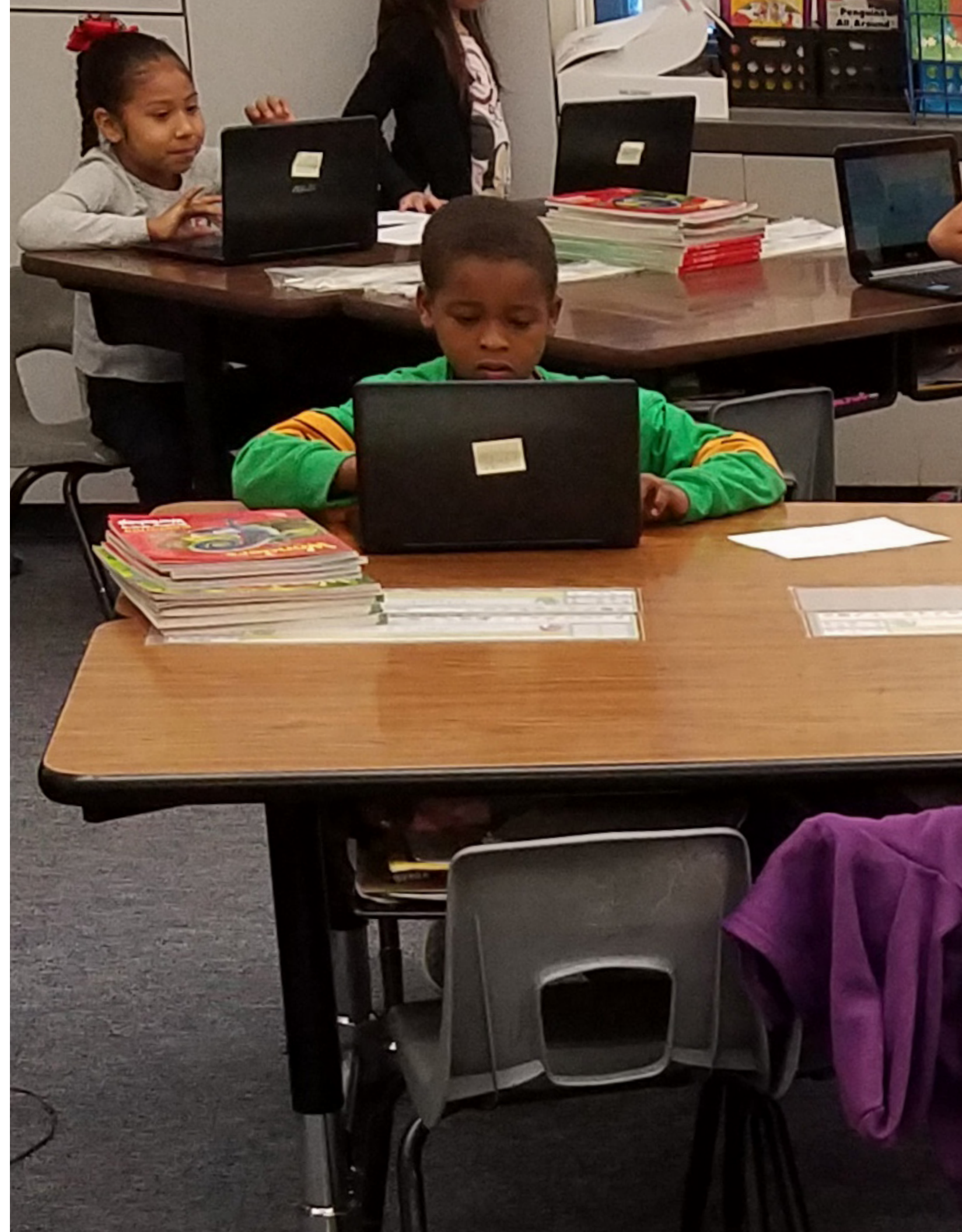
We will analyze data on Smarter Balanced outcomes later this year as that data becomes available. Our next report will also include additional data on students' use of digital curriculum materials and assessments from HMH.

ELA: PLI Relative Gains

Math: PLI Relative Gains



Sources: Spring Interim Common Assessment, Fresno Unified, All Grades. These analyses adjust for student attendance, ethnicity, gender, homelessness, school type, special education status, language learning status, low income status, school climate and having an ELA and/or Math teacher in the PLI program.



Essential Reflections and The Next Learning Cycle

For school and district leaders, this data provides compelling evidence that the type of holistic approach represented by the PLI is necessary for realizing the return on investments in technology in terms of learning outcomes. The pedagogical model centered on student voice, choice and collaboration, combined with the intentional deployment of technology for every student, enabled the substantive, meaningful student use of technology that is leading to the PLI's learning outcomes. The pedagogical model is the core of the PLI. This report's analysis of learning outcomes from the first year's learning cycle shows us that this combination is working, though further investigation and program refinements are needed. Importantly, the story of progress in this report needs to be shared with all Fresno teachers and the broader community, we all need to the of evidence on how the initiative is working.

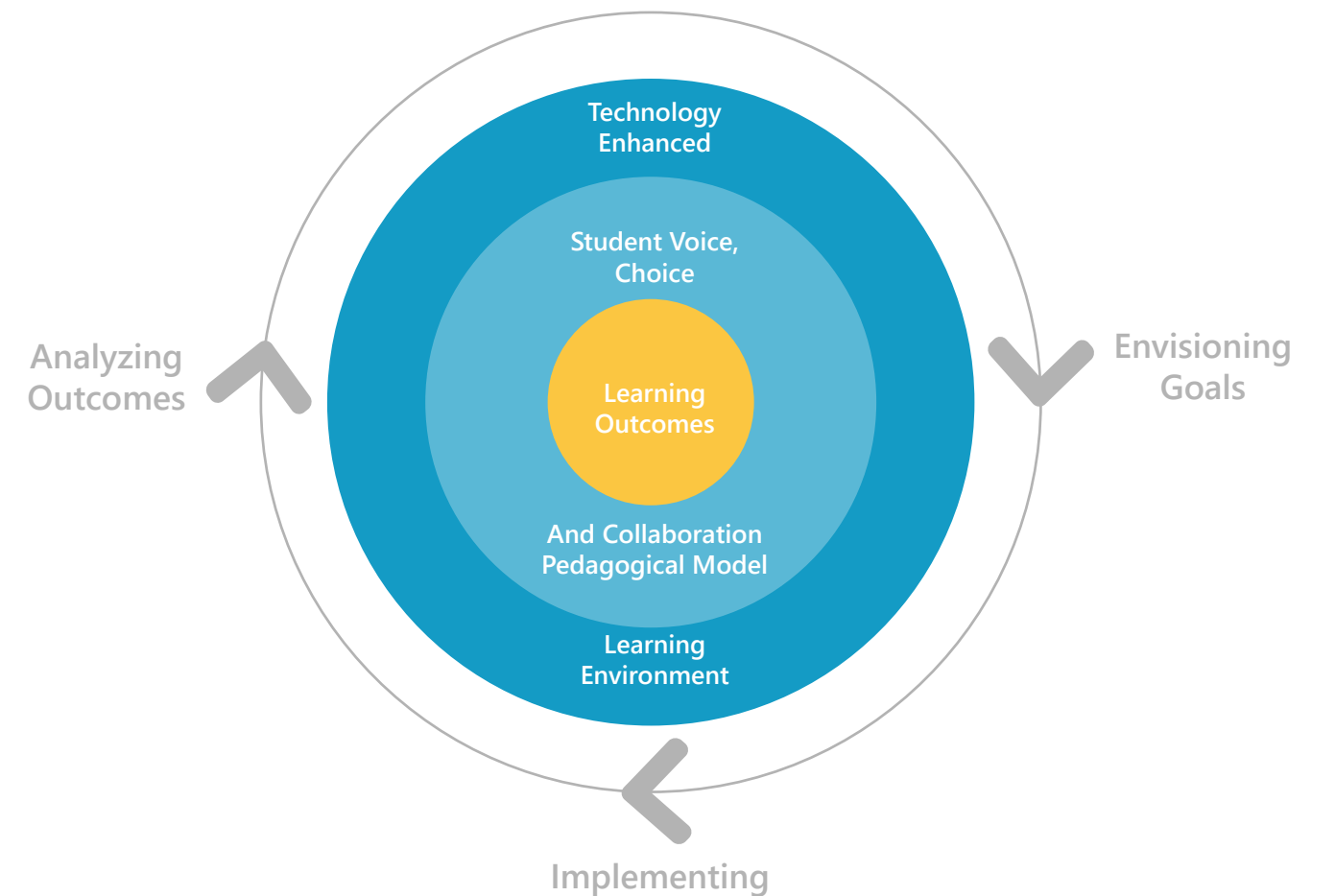
The PLI has launched the transformation towards future competencies, but currently it reaches only those teachers and students involved in the PLI. Expanding the PLI quickly and broadly enough to meet teachers and students' needs, while maintaining implementation fidelity, is our biggest challenge. We know that whole system change requires whole system change, so as we begin the next collaborative learning cycle, we will spread change intentionally based on the improvements described in this report.

The PLI in Year 2 will both expand and deepen the work. Expansion efforts include a new teacher cohort (75 additional teachers), site-level implementations through 10 partner schools, "Exemplar" classrooms for demonstrations and shared learning, and the embedding of the pedagogical model within programs such as Career and Technical Education. Deepening the PLI involves further development of the pedagogical model and professional learning focused on collaboratively designing learning tasks that explicitly develop future competencies ([21st Century Learning Design](#)). In addition, Microsoft will continue to partner with Fresno Unified for analyzing learning outcomes (expect a second analytics report later this year), and Microsoft will offer aligned professional learning opportunities online for teachers Fresno outside the formal PLI. Fresno State will begin integrating the PLI pedagogical model and approaches in its pre-service teacher education program. And we will grow our partnership, with Houghton Mifflin Harcourt joining our analytics work this summer.

The path of learning transformation is high risk, high reward. But as we stated at the outset of this report, the status quo is not an option if we are committed to learning becoming more relevant for all learners' futures. We don't have all the answers. We do believe those involved in the education transformation con-

versation share many common questions. Our work has been informed by the experiences of other schools and systems, and in turn, we are committed to making visible what we are learning along our PLI journey. Analytics reports, videos and stories from our work will

be published over the coming years, shared with those engaged in the transformation conversation. We invite you to join the dialogue.



Resources

ⁱ Herold, B. (2017). "Poor Students Face Digital Divide in How Teachers Learn to Use Tech." Education Week, Technology Counts 2017. Retrieved 6/17/17 from: <https://www.edweek.org/ew/articles/2017/06/14/poor-students-face-digital-divide-in-teacher-technology-training.html>

ⁱⁱ 21st Century Learning Design is a professional learning program based on the Innovative Teaching and Learning Research Project (2009-2012) <https://education.microsoft.com/GetTrained/21CLD-1>

ⁱⁱⁱ Hattie, J. (2009). Visible Learning: A Synthesis of over 800 Meta-Analyses Relating to Achievement. London: Routledge. See also, Pane, J., Steiner, E., Baird, M., and Hamilton, L. (2015). "Continued Progress: Promising Evidence on Personalized Learning." RAND, retrieved from: http://www.rand.org/content/dam/rand/pubs/research_reports/RR1300/RR1365/RAND_RR1365.pdf; and Bransford, J., Brown, A., and Cocking, R. Eds. (2000). How People Learn: Brain, Mind, Experience and School. Washington, DC: National Academy Press.

^{iv} Within the analysis, we conducted a sub-analysis of whether teachers in the PLI were a biased sample, in terms of previously having a history of above-average ability to advance student growth in ELA and Math. We compared PLI and Non PLI teacher groups on this dimension based on the previous year's Smarter Balanced assessments. Our analysis was inconclusive due to relatively small sample sizes of teachers in the PLI in ELA and Math. We will continue to assess teacher efficacy as more data on Smarter Balanced assessments becomes available.

^v PLI teachers committed to engage in the initiative and share their learning both at their schools and across Fresno Unified. Due to contractual agreements for teacher professional learning hours, the PLI training relied on teachers taking the initiative to attend outside of their contracted time. To facilitate implementation, the PLI team designed optional learning opportunities, with compensation at teachers' supplemental rate, that occurred during after-school in evenings or on Saturday sessions. Elementary teachers participated in 17.64 hours of PL on average, Middle school teachers 14.4 hours on average, and high school teachers 12.94 on average. The teachers rated the sessions above a 90% positive on effectiveness.

^{vi} PLI teachers were introduced to the SAMR model of technology integration, based on the work of Dr. Ruben Puentedura.

^{vii} The PLI Teacher Survey is based on the Innovative Teaching and Learning Research project, with research methods developed by SRI International. <https://education.microsoft.com/GetTrained/ITL-Research>

^{viii} See the 21st Century Learning Design program at <https://education.microsoft.com/GetTrained/21CLD-1>. These types of PLI teaching practices have been shown in other research projects to be strongly correlated with students' development and demonstration of future competencies. See ITL Research findings from 2011. <https://msenmediastorage.blob.core.windows.net/asset-8712445d-1500-80c6-5719-f1e5150797bd/d90b359d-c1f1-414a-b329-d699e8945018.pdf?sv=2012-02-12&sr=c&si=8ac6930c-0a8f-4bf6-9350-7529b3c458b1&sigold=eweGGXEuZ0VbOs-9jKJd5yTdCIDynST3dGVAqOkcV7KM%3D&st=2015-06-17T15%3A38%3A36Z&se=2045-06-09T15%3A38%3A36Z>

^{ix} Digital collaboration in this chart represents those FUSD teachers who have been collaborating online with other teachers in Microsoft Word, Excel or PowerPoint at least once within a 28-day time window ending on the last day of the considered month. Collaboration between A and B corresponds with 3 possible scenarios: 1) A edited document Doc1 that B further read; 2) B edited document Doc1 that A further read; 3) A and B both edited document Doc1. But if A and B both read document Doc1, they are not considered as collaborators. As long as an individual satisfies one of the three scenarios above once a month, they are considered as a collaborator.

^x Kautz, T., et al. (2014), "Fostering and Measuring Skills: Improving Cognitive and Non-cognitive Skills to Promote Lifetime Success", OECD Education Working Papers, No. 110, OECD Publishing, Paris.

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^{xi} <http://www.cde.ca.gov/eo/in/cr/p21cskls.asp>

^{xii} <http://www.pacer.org/c3/curriculum/Session7/handouts/Five%20Levels%20of%20Collaboration.pdf>

About the Authors

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Sample reference: Langworthy, M. & Neufeld, P. (2017) Fresno Unified, the Futures Challenge, and 21C Learning Design: Fresno Personalized Learning Initiative: Year 1 Report. Redmond: Microsoft.