education northwest

CREATING STRONG SCHOOLS & COMMUNITIES

Year 1 Findings for *Scaling High Quality Project Based Learning for Deeper Learning Impact*

2019 Annual Report
Prepared for PBLWorks

December 2019

About Education Northwest

Founded as a nonprofit corporation in 1966, Education Northwest builds capacity in schools, families, and communities through applied research and development.

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Introduction

Scaling High-Quality Project Based Learning (HQPBL) for Deeper Learning Impact is a research-practice partnership (RPP) that includes PBLWorks, Manchester School District (MSD), Pearl City-Waipahu Complex Area (PCW), and Education Northwest. This RPP is funded by the William and Flora Hewlett Foundation to investigate the diffusion of innovation and scaled impact of deeper learning.

This 2019 annual report, prepared for PBLWorks by Education Northwest, presents results from data collected in 2018–19 (Year 1), including changes since the baseline year (2017–18) report (Petrokubi, LeMahieu, Holmgren, & Denton, 2019).[1]

This report is organized into five sections:

- The **introduction** provides an overview of the RPP, research sites, implementation plan, and research design.
- **Chapter 1** describes key findings across the two school systems for 2018–19.
- **Chapter 2** presents findings for MSD for 2018–19.
- **Chapter 3** presents findings for PCW for 2018–19.
- The **technical appendix** includes a more detailed description of the research methods and samples, along with the research plan for 2020.

RPP Overview

The *Scaling HQPBL for Deeper Learning Impact* RPP aims to increase the number of students engaged in two high-quality projects per year by increasing the number of quality projects designed and taught (figure 1). The goal is to improve deeper learning outcomes, including mastery of core content, communication, collaboration, and critical thinking/problem solving. The project is especially focused on reaching students who were identified by MSD and PCW as being furthest from opportunity, including students experiencing poverty, English learner students, and students receiving special education services.

To accomplish this goal, from 2018 to 2020, PBLWorks is offering training and coaching to two cohorts of schools in MSD and PCW. These services aim to increase motivation and demand for HQPBL, educator capacity for Gold Standard design and facilitation, and school/school system leadership capacity to create the conditions necessary for teachers to design and facilitate Gold

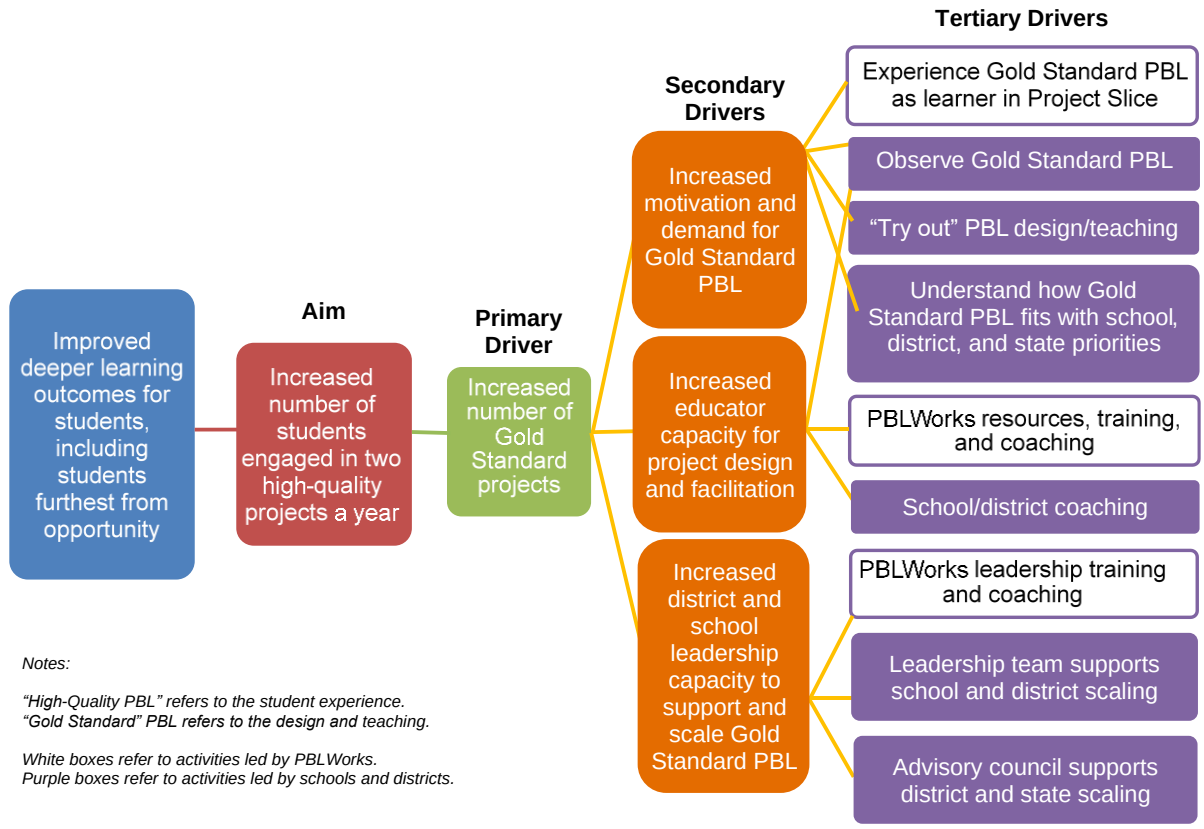
[1] For baseline results in 2017–18, see Petrokubi, J., LeMahieu, R., Holmgren, M., & Denton, A. (2019). *Research design and baseline conditions for understanding the scaled impact of HQPBL for deeper learning. 2018 annual report: Prepared for PBLWorks*. Portland, OR: Education Northwest.

Standard projects with all students, including and especially those who are furthest from opportunity.

At the start of the project, school and school system leaders developed "scaling maps" to outline their strategies for scaling and diffusion. In selecting the first cohort of schools and teachers to participate in PBL 101, they considered various factors, such as school-level adoption of PBL and school demographics, individual-level adoption of PBL and opinion leadership, feeder patterns, and the percentage of students furthest from opportunity in the schools. Drawing on diffusion of innovation theory (Rogers, 2003), leaders were advised to include as many PBL early adopter opinion leaders as possible, with the idea that these individuals were best positioned to diffuse PBL through their social networks.

A fundamental assumption of this approach is that teachers who participate in PBL 101 will diffuse quality PBL through their social networks, especially teachers identified by schools as PBL early adopter opinion leaders, while school leadership teams create supportive conditions for scaling this innovation.

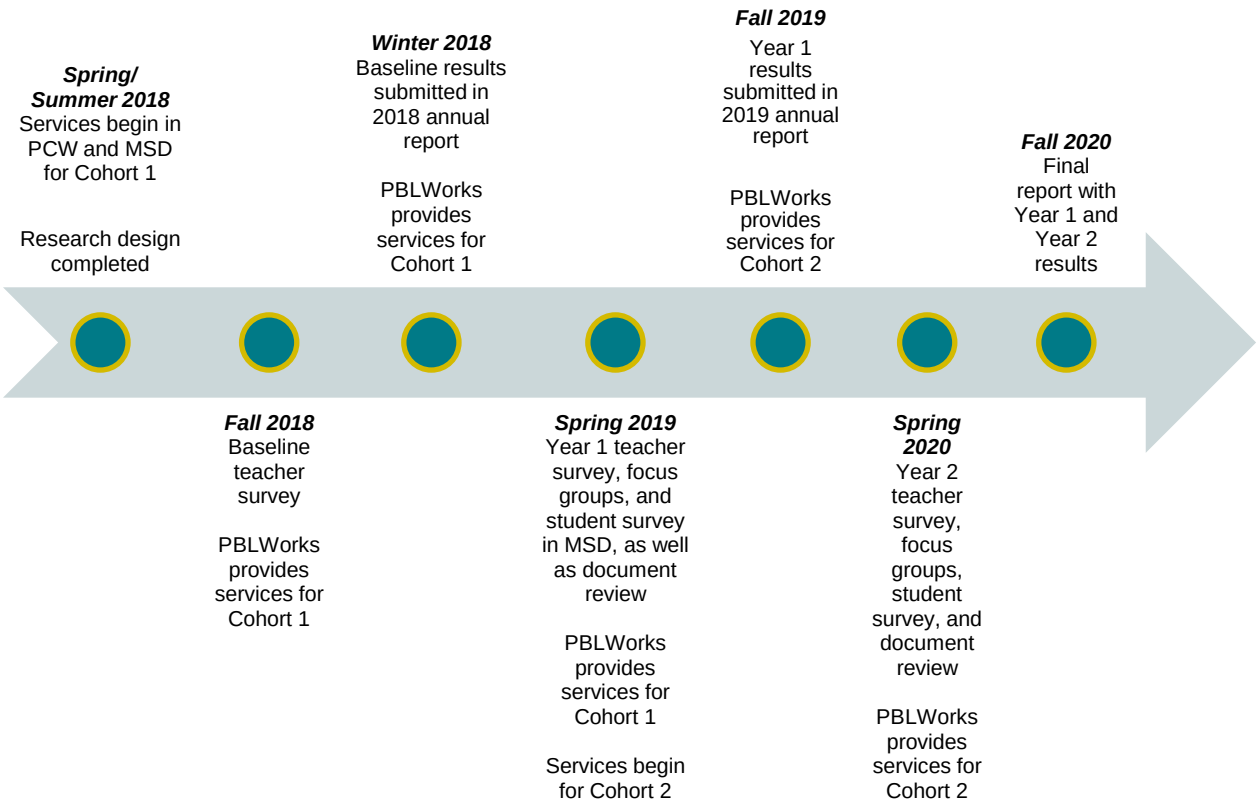
Figure 1. Driver diagram for scaling HQPBL for deeper learning impact



School System Context and Implementation

The original project design was to provide PBL 101 training to 245 strategically selected teachers in each school system annually, with the expectation that about half of all teachers in each school system would receive training by the end of the project and others would be inspired to adopt PBL through the diffusion process. The following is a description of each school system and its implementation of PBL during Year 1. Figure 2 provides a timeline of implementation and research activities from 2018 to 2020.

Figure 2. Timeline of research and implementation activities, 2018–2020[2]



MSD Schools and Students

MSD consists of four high schools, four middle schools, and 14 elementary schools. It includes four community schools and three Southern New Hampshire University laboratory schools. There are also 10 charter schools that are not included in this project.

In 2017–18, MSD enrolled 13,476 students and employed 970 teachers, over half of whom have a master's degree or higher.[3] Overall, 43 percent of students identified as people of color, 60

[2] PBL 101 trainings for PCW were typically scheduled for the spring semester before implementation the following fall. PBL 101 trainings for MSD were conducted in later summer, before the start of the school year.

[3] Data downloaded from https://www.education.nh.gov/data/attendance.htm#sau in October 2019.

percent qualified for free or reduced-price lunch, 21 percent received special education services, and 15 percent were English learners.[4] Besides English, the most common languages spoken in MSD are Spanish, Arabic, Nepali, Swahili, and Vietnamese.[5]

There is strong support for this project from the state education agency, school board, and union. Coordination of this project is managed though Assistant Superintendent Amy Allen; in 2018–19, there were no other districtwide staff members or coaches to support PBL.[6] MSD teachers have been working without a contract since the start of this project, and district leaders negotiated with union leaders to make teachers available for training over the summer since MSD has a shortage of substitute teachers. In spring 2019, the superintendent left after less than two years in the role. A new superintendent was hired in summer 2019. Since 2014, MSD has been under review by the U.S. Department of Education's Office for Civil Rights regarding exclusion of black and Hispanic students from postsecondary readiness opportunities (OCR Compliance Review No. 01-11-5003). The district has a private grant to understand and address barriers to postsecondary readiness.

Year 1 Implementation in MSD

At the start of the project, five schools were identified by MSD district leadership as implementing PBL in at least half of their classrooms. Two of these schools were reportedly implementing PBL schoolwide. This grant marks the first time MSD has partnered with PBLWorks, although two schools sent staff members to PBLWorks trainings four or more years before the start of this project. Cohort 1 included eight elementary schools, four middle schools, and one high school. Cohort 2 includes six elementary schools and three high schools.

All schools in Cohort 1 have at least some teachers who were facilitating PBL before the start of the project, whereas Cohort 2 includes schools with little to no experience with PBL. The PBL leadership team at each of the schools is typically the existing leadership team for the school and is primarily composed of non-teaching staff members. Leadership team members started receiving training in spring 2018, whereas teachers from Cohort 1 schools participated in PBL 101 in summer 2018. Most schools have professional learning communities (PLCs) in place that are expected to be a key mechanism for diffusing PBL.

PCW Schools and Students

PCW consists of two high schools, two intermediate schools, and 13 elementary schools. It includes the Pearl City Complex and the Waipahu Complex, which are two adjacent communities. The two complexes share staff members but also operate their own distinct initiatives in response to local priorities.

[4] Data provided through personal communication with MSD in June 2019.
[5] Data downloaded from http://englishlearners.mansd.org/el-data-languages in October 2019.
[6] A district-level teacher on special assignment (TOSA) for PBL and equity was hired for 2019–20.

In 2016–17, PCW employed 915 teachers (391 in Pearl City and 524 in Waipahu), about a third of whom have a master's degree or higher.[7] In 2017–18,[8] the complex area enrolled 14,288 students. Overall, 94 percent of students identified as people of color, 45 percent qualified for free or reduced-price lunch, 9 percent received special education services, and 15 percent were English learners. Besides English, the most common languages spoken across PCW are Tagalog, Chuukese, Samoan, Marshallese, and Ilocano.

There is strong support for this project from the state education agency, which is involved in other partnerships with PBLWorks. In addition, there is robust technical assistance for PBL available to schools from complex area personnel. The project is managed at the complex area level by Kathleen Burch, a complex area teacher, and a PBL resource teacher supports implementation by providing PBL coaching to complex area-level instructional coaches, as well as school-level staff members. Over the course of the project, the initial complex area lead staff member left their position, and there have been three superintendents. One of the former superintendents remains actively involved in the project through their new position at the Hawaii State Department of Education and participates in the project's advisory council.

Year 1 Implementation in PCW

This grant marks the first time the complex area has partnered with PBLWorks, although a couple of schools sent staff members to PBLWorks trainings before the start of this project. Cohort 1 included seven elementary schools, two intermediate schools, and one high school. Cohort 2 includes seven elementary schools and one high school.

Each cohort includes schools with a range of PBL-related experience, with eight schools facilitating some PBL prior to the start of the project. The PBL leadership team at each of the schools is primarily composed of non-teaching staff members. In spring 2018, leadership team members started receiving training, and teachers from Cohort 1 schools participated in PBL 101.

Research Design

To investigate the processes by which quality PBL design, facilitation, and student experiences increase across these school systems, this study draws on research regarding diffusion of innovation (Rogers, 2003) and scaling within education (Coburn, 2003). The project is also grounded in frameworks developed by PBLWorks in collaboration with other leaders in the field to understand the quality of PBL:

- *Gold Standard Project Based Learning* refers to the quality of project design and facilitation to promote student learning of key knowledge, understanding, and success skills (Larmer, Mergendoller, & Boss, 2015). A project that meets Gold

[7] Data downloaded from http://www.hawaiipublicschools.org/VisionForSuccess/SchoolDataAndReports/StateReports/Pages/home.aspx in October 2019.

[8] Data received via personal communication with PCW.

Standard Design Elements features student learning goals, a challenging problem or question, sustained inquiry, authenticity, student voice and choice, reflection, critique and revision, and public product.[9] This study uses this framework in the teacher survey and project plan analysis. It does not examine PBLWorks' Gold Standard Project Based Teaching Practices (Larmer et al., 2015)—only project design.

- *High-Quality Project Based Learning (HQPBL)* refers to the quality of student experience on projects (Mergendoller, 2018). HQPBL comprises six criteria: intellectual challenge and accomplishment, collaboration, authenticity, reflection, project management, and public product. For each of these criteria, *A Framework for High Quality Project Based Learning* (2018) offers guiding questions to assess the quality of student experience on a given project. This study used this framework in designing questions for the student survey.[10]

In addition, PBLWorks provides training for leaders on creating four key system conditions for PBL: vision, culture, capacity building, and continuous improvement. This study examines all four system conditions in focus groups and looks specifically at conditions related to culture and capacity in the teacher survey.

Although the study is informed by the PBLWorks frameworks described above, we were not able to assess each of these elements in depth, as discussed further in the data collection and analysis section below.

This mixed-methods study is guided by two research questions (figure 3).

[9] The project plan analysis examines all eight of these design elements. The teacher survey did not include questions about student learning goals or reflection due to space limitations.

[10] Although the student survey asked students to report on their experiences with each of these six HQPBL criteria, in this report, we discuss only results for the criteria that aligned with the Gold Standard Design Elements that were measured on the teacher survey to facilitate data triangulation.

Figure 3. Research questions and methods

	Research Questions	*Methods*
	**1. To what extent do students, including students furthest from opportunity, experience two high-quality projects each year?** a. To what extent are teachers designing, adapting, or adopting Gold Standard PBL? b. To what extent do students report deeper learning on projects?	• Teacher survey (matched with student rosters) • Educator focus groups • Project plans • Student survey
	***2. How does quality PBL scale and spread within and across schools?*** a. What are the patterns of diffusion? b. What system conditions enable or constrain teachers and leaders in scaling quality PBL?	• Teacher survey • Educator focus groups

Data Collection and Analysis

Education Northwest collaborated closely with PBLWorks, MSD, and PCW staff members to design the instruments and plan data collection. Data collection was conducted in spring 2019 to allow adequate time for Cohort 1 participants to implement new practices.

Research Question 1: Project Facilitation, Project Quality, and Deeper Learning

To address the first research question, we analyzed data from the teacher survey, class rosters, and student survey (described below) to report on teachers' and students' project experiences. When possible, we compared baseline data and Year 1 data to understand change over time in teacher practices and disaggregated data by school (e.g., cohort) and teacher characteristics (e.g., experience with PBL), testing to see whether any differences were statistically significant.[11] Disaggregating data by teacher characteristics enabled us to investigate whether adoption of quality PBL was diffusing beyond the teachers who participated in PBL 101 and schools in Cohort 1. We also disaggregated data by student characteristics (e.g., English learner) to investigate the degree to which students who were furthest from opportunity experienced quality projects and deeper learning outcomes.

In addition to survey data, we analyzed focus group data by identifying common themes on how educators perceive PBL practice and deeper learning outcomes.

[11] Statistical significance means the difference between the two groups is real and unlikely to have occurred by chance. A significance level of 5 percent ($p < 0.05$) means that only five times out of 100 a significant difference might occur by chance.

Research Question 2: System Conditions and Diffusion of PBL

To address the second research question, we analyzed data from the teacher survey and focus groups to gain insight from educators about the processes of scaling quality PBL across their school systems. We used social network analysis (SNA) of data from the teacher survey to examine whether and how quality PBL may diffuse through teacher relationships. Again, we analyzed change over time when possible and disaggregated data by school and teacher characteristics. As part of the analysis, we triangulated data across methods (e.g., teacher survey and focus groups) and data sources (e.g., MSD teacher survey and student survey), and we report areas in which findings converge or diverge.

Use of the term "quality project" in this report

Given the large scale of data collection across these two school systems and the subjectivity of asking teachers to report on the quality of their own practice, it was not possible to assess whether each project reported on the teacher survey was of ***high*** quality. For example, although we can use teacher survey data to indicate whether a project involved a driving question, we do not have enough information to determine whether the driving question itself was of high quality (e.g., appropriate level of challenge for students).

Therefore, we use the number of Gold Standard Design Elements present in the project (as reported by the teacher) as a proxy for project quality. Since these design elements are essential to quality PBL (Larmer et al., 2015), the more design elements present, the more likely the project is quality. Projects that contain at least four of the six design elements measured on the teacher survey are reported here as quality. In consultation with PBLWorks, we determined to use a similar process in assessing whether project plans met the minimum threshold of quality for each of the eight design elements.

The following is a summary of Year 1 data sources. See the appendix for more detailed descriptions of data collection and analysis.

Teacher survey. To answer both research questions, Education Northwest invited all teachers in MSD and PCW to participate in an online survey about their experience with PBL, the projects they taught, the system conditions in their school, and their professional social networks. Education Northwest administered the survey to 2,003 teachers across both school systems, with an overall response rate of 29 percent (582). About 72 percent (416) also completed the baseline survey in fall 2018, so we can provide information on change over time for these teachers. Across both school systems, response rates were higher for elementary schools than secondary schools (see appendix A).

Teacher project quality score. To answer research question 1, the survey asked teachers to report on project quality for six of eight Gold Standard Design Elements: driving question, sustained inquiry, authenticity, student voice and choice, critique and revision, and public product. The survey did not include questions about student learning goals or reflection due to a need to reduce survey length to ensure a robust response rate.

Project quality is defined as the presence of each element; we do not measure *high* quality in this report due to the limited information available at the school system level and the subjectivity of asking teachers to rate the quality of their own practices. Using teacher survey item responses, we determined whether each of the six elements was present (according to teachers). When the

element was present, we assigned a score of 1 (indicating the project met a minimum threshold for *quality* for that element) and a score of 0 when the element was not present. In consultation with PBLWorks, we created an overall project quality score by adding the assigned values for each element, creating a range of possible scores of 0 to 6. For example, an overall project quality score of 5 means the project included five of the six Gold Standard Design Elements assessed on the teacher survey. The overall project quality score facilitates assessment of change over time, as well as triangulation with student survey results and project plan analysis results. See table A3 in appendix A for the teacher survey items used to calculate project quality scores.

Roster matching to identify students' project experiences. To answer research question 1, we identified students who experienced projects based on matching teachers who reported facilitating projects with students in their school system. We were able to match teacher surveys with rosters for 78 percent (10,669) of MSD students and 68 percent (9,439) of PCW students. Percentages in this report are based on the number of students who could be matched to a teacher survey response. The demographics of this sample are largely representative of the overall student population for each school system, with elementary school students slightly underrepresented in both school systems. Thus, the roster-matching results should be understood as an approximation of how many students in each of these school systems experienced a project (see appendix A).

Analysis of teacher social networks. To answer research question 2, the survey asked teachers to report whom they go to for advice. We asked teachers in both the baseline (2017–18) and Year 1 (2018–19) teacher surveys, "Who did you go to most often for advice or with general questions related to content knowledge, your instructional practice, or navigating school systems (i.e., figuring out school management or bureaucracy)?" Their answers to this question were used to identify teachers who shared a relationship, or tie,[12] in the social network. It is through these ties that diffusion of information could occur. Additionally, we calculated "in-degree centrality," or the number of times an individual was identified by a survey respondent as a person to whom they go for advice. Thus, survey respondents identified individuals with high in-degree centrality as opinion leaders in the network (see appendix A).

Educator focus groups. To answer both research questions, Education Northwest conducted separate focus groups with administrators, principals, leadership team members, and teachers in each school system. A total of 54 individuals participated in focus groups—22 from MSD and 32 from PCW. In focus groups, administrators and leadership team members reflected on their vision and plan for PBL, effectiveness of scaling strategies, signs of progress related to the diffusion of PBL, and lessons learned. Teachers were also asked to reflect on changes in their school, students, and own practice related to PBL and to provide feedback on the school and district/complex area support they received for PBL (see appendix B).

[12] Teachers are "tied" when they identify or were identified by another teacher in the network as a source of advice.

Project plans. To answer research question 1a, we invited teachers to upload a project plan upon completion of the teacher survey. We received 25 plans from MSD (from nine schools) and 27 plans from PCW (from eight schools). Through purposeful sampling, we selected at least 10 plans from each school system, representing a range of Cohort 1 schools, grades, and subject areas. Overall 11 plans were analyzed from eight Cohort 1 schools in MSD, and 10 plans were analyzed from six Cohort 1 schools in PCW (see table C1 in appendix C).

Using a scoring guide developed in collaboration with PBLWorks, two analysts reviewed these plans to determine whether they met the threshold for each of the eight Gold Standard Design Elements: challenging problem or question, student learning goals, reflection, sustained inquiry, authenticity, student voice and choice, critique and revision, and public product. Plans received a score of 1 for each design element present, for a total possible score of 8 (see appendix C).

Student surveys (MSD only). To answer research question 1b, Education Northwest helped MSD teachers administer an online survey to students in grades 4–12 upon completion of projects in spring 2019. The survey asked students to report on whether they experienced the elements of HQPBL on the project: intellectual challenge and accomplishment, collaboration, authenticity, reflection, project management, and public product. We also asked students to indicate the degree to which they felt the project increased their mastery of core content, as well as deeper learning skills (such as critical thinking/problem-solving, communication, and collaboration). Students in seven schools completed the survey. Over 90 percent of the responses came from four schools, and just over 50 percent of the responses came from one middle school. Completed surveys were received from 551 students, and 42 percent of respondents were in grade 6 (see appendix D).

Student project quality score. To facilitate triangulation with the teacher survey, we collaborated with PBLWorks to crosswalk HQPBL elements with Gold Standard Design Elements to create a student overall project quality score aligned with the teacher survey. We calculated a quality score for each of the six elements in the same manner as described above for the teacher survey. Using student survey item responses, we determined whether each of the six elements was present (according to students). We assigned a score of 1 when the element was present (indicating the project met a minimum threshold for quality for that element) and a score of 0 when the element was not present. In consultation with PBLWorks, we created an overall project quality score by adding the assigned values for each element, creating a range of possible scores of 0 to 6. For example, an overall project quality score of 5 means the project included five of the six Gold Standard Design Elements assessed on the student survey. See table A3 in appendix A for the student survey items used to calculate project quality scores.

Limitations

There are several limitations to note in interpreting the results of this large study. The first is the relatively low response rate for the teacher survey, especially in terms of the number of respondents who took the survey both at baseline and during Year 1. For the SNA, this small sample size reduced our ability to conduct more fine-grained analyses. To ensure a robust response rate, we kept the teacher survey as short as possible while responding to the request

from the research partners to investigate multiple issues of interest. Therefore, we focused on a select set of system conditions (two of four included in PBLWorks trainings) and Gold Standard Design Elements (six of eight included in PBLWorks trainings).

In addition, given the small number of teachers who submitted project plans, we were unable to randomly select a sample as planned. Therefore, we do not expect that these results are representative of design quality across the school system, as the most motivated teachers (such as PBL early adopters) may have taken the extra step to upload a project plan with their survey. Finally, we do not have student survey data for PCW due to delays in receiving approval the Hawaii State Department of Education's institutional review board (IRB). Therefore, we cannot answer research question 1b for PCW.

Chapter 1. Findings Across MSD and PCW

In this chapter, we discuss common findings across both school systems. First, we discuss results related to research question 1: *To what extent do students, including students furthest from opportunity, experience two high-quality projects each year?* We present data regarding project facilitation (number of projects taught); project quality; and deeper learning from the teacher survey, class rosters, educator focus groups, and project plans.

Next, we examine research question 2: *How does quality PBL scale and spread within and across schools?* We draw on the teacher survey and educator focus groups to report on findings related to system conditions and teacher networks and how they may relate to the diffusion of quality PBL.

More detailed findings for MSD can be found in Chapter 2 and for PCW in Chapter 3.

Research Question 1:
To what extent do students, including students furthest from opportunity, experience two high-quality projects each year?

The results below are primarily based on reports of the number and quality of projects facilitated in spring 2019 by teachers who completed the survey (N = 582). We received surveys from 29 percent of MSD teachers (298) and 30 percent of PCW teachers (294). Teacher surveys were then matched with class rosters to infer the number of students who experienced these projects in each school system. We were able to match teacher surveys with rosters for 78 percent of MSD students (10,669) and 68 percent of PCW students (9,439). The demographics of this sample are similar to the overall demographics of the student population of each school system. We summarize relevant findings from the educator focus groups (N = 54, with 22 participants from MSD and 32 participants from PCW) and project plan analysis (N = 21, with 10 plans from MSD and 11 plans from PCW) to provide additional perspective on this discussion of findings related to the number and quality of projects facilitated in Year 1.

Project Facilitation

In this section, we first discuss the number of projects teacher survey respondents reported facilitating in spring 2019. Next, we discuss the percentage of students who experienced these projects based on matching class rosters with teacher survey results.

Number of Projects Facilitated by Teachers

Overall, 40 percent of *teachers* reported an increase in the number of projects they taught from baseline (2017–18), with significantly higher rates of teachers from Cohort 1 schools and

PBL 101 participants teaching projects in Year 1 (2018–19) compared with Cohort 2 schools and teachers who did not participate in PBL101. Overall, 56 percent of survey respondents reported teaching a project in Year 1 compared with 51 percent at baseline. A total of 22 percent of teachers taught a project in Year 1 who did not teach a project at baseline.

Across all focus groups, MSD and PCW educators most frequently identified an increase in the number of projects facilitated in schools as a sign that PBL is scaling in their school system. Educators reported that in 2018–19, a growing number of teachers were facilitating projects in their schools. For example, participants commonly offered observations such as "classroom doors are opening" to indicate more teachers were facilitating projects and trying new practices, such as developing public products. They suggested schools were making learning visible though PBL, in terms of "seeing more color on the walls" as classes display their work in hallways and invite others to hear about the results of their inquiry.

> *We've been doing PBL for seven years, so we have 100 percent participation—minimum of two projects … all the teachers at the beginning of the year signed up and collaborated.* (MSD focus group participant)

> *We had 100 percent of our students, at least from K to 6, participate in a project. And all the teachers, regardless of their training about it, implemented a project—either individually or with teams in their grade levels. So next year, we're … going deeper into the quality of the projects.* (PCW focus group participant)

> *The classroom door isn't closed; we're sharing more than we've ever shared before.* (MSD focus group participant)

Number of Projects Experienced by Students

Among *students* matched with teachers who facilitated projects, 76 percent in PCW and 63 percent in MSD experienced at least one project. Rates remained slightly lower for English learner students and students receiving special education services. For PCW, the percentage of students experiencing at least one project increased by 13 percentage points over baseline to 76 percent in Year 1. This percentage declined by 2 percentage points in MSD to 61 percent.

Quality of Projects[13]

In Year 1, we received project quality data from 308 teachers, 131 of whom completed both the baseline and Year 1 survey. **In Year 1, 67 percent of *teachers* reported that their project included at least five of the six Gold Standard Design Elements measured,[14] with few projects meeting the threshold for driving question.** For 47 percent of teachers, there was change in reported project quality between baseline and Year 1. Overall quality scores increased

[13] See page 8 for a more detailed discussion of how quality is determined in this report.

[14] The teacher survey did not ask teachers to report on two additional Gold Standard Design Elements: *reflection* and *student learning goals*.

for 27 percent—but decreased for 26 percent—of teachers. In terms of improvements, 10 percent more teachers from baseline reported that their project met the quality threshold for *driving question,* and 14 percent more respondents reported that their project met the quality threshold for *public product*.

In Year 1, 64 percent of *students* in PCW and 50 percent of students in MSD experienced projects that met five of the six Gold Standard Design Elements measured.[15] In MSD, an additional 15 percent of students experienced projects with four Gold Standard Design Elements, and in PCW, an additional 12 percent of students experienced four Gold Standard Design Elements.

Evidence of Gold Standard Design Elements in Project Plans

Analysis of a sample of project plans submitted with teacher surveys indicated that many of these teachers are incorporating Gold Standard Design Elements into their planning. Overall, 71 percent (15) of the sampled plans included five or more of the six Gold Standard Design Elements measured in the teacher and student surveys, and 90 percent (19) contained four or more of these elements.

All plans involved a *driving question* and *sustained inquiry*. In contrast to the teacher survey results, all 21 project plans included a *driving question* (table 1). All plans also involved *sustained inquiry* of two weeks or more and included asking students to find and use resources/data. Over three-quarters of the plans allowed students to develop their own answers to questions, and a little more than a quarter allowed students to ask their own questions.

All but one plan included *student learning goals*, and 86 percent named success skills, especially critical thinking/problem solving. Twenty out of 21 plans described how *student learning goals* would address state standards or national standards, such as Next Generation Science Standards. About 86 percent of plans included specific success skills in their goals. These plans most frequently aimed to develop students' critical thinking/problem-solving skills (76 percent), followed by collaboration skills (48 percent) and communication skills (14 percent). Further, 90 percent of plans included a *public product*. In many plans (71 percent), this involved students presenting their final work to other classes, teachers, or family members, and close to 50 percent involved presentations that were delivered to audiences outside of school to members of the community, such as content experts, or published online. Less commonly, 86 percent of teachers also provided *reflection* in their plan, typically in the form of journals/learning logs, as well as varying forms of group and class discussions.

***Critique and revision* (71 percent) and *authenticity* (67 percent) were less prevalent in plans than the other elements**. Plans that included *critique and revision* typically provided students with equal opportunity to give feedback, receive feedback, and use feedback to improve their work. The most common aspect of *authenticity* in the plans was the use of real-world processes,

[15] Percentages are based on the number of students who could be matched to a teacher survey response.

tools, or quality standards (67 percent). Fewer plans included opportunities to explore students' own concerns, interests, and identities (26 percent) or to make a real impact beyond the classroom (19 percent).

MSD and PCW varied in terms of the degree to which their plans included examples of *student voice and choice*. Combined, about 67 percent of plans met the threshold for this element, with most choices offered regarding project process. Overall, 48 percent of the plans provided opportunities for students to make decisions about how they did their projects (e.g., choosing how to build a model house), and 33 percent allowed students to choose what they studied (e.g., choosing which cities to study).

Table 1. Percentage of analyzed plans across MSD and PCW that met the quality threshold for each of the eight Gold Standard Design Elements (n = 21)

Gold Standard Design Element	Percentage and number of plans that met the quality threshold
Challenging problem or question	100% (21)
Sustained inquiry	100% (21)
Student learning goals*	95% (20)
Public product	90% (19)
Reflection*	86% (18)
Critique and revision	71% (15)
Authenticity	67% (14)
Student voice and choice	67% (14)

* Indicates this element was not measured in the teacher survey.

Source: Authors' analysis of project plans submitted with teacher surveys.

Focus group participants frequently noted that they prioritized increasing the number of teachers facilitating projects in Year 1, with plans to focus more in-depth on quality in Year 2. They did, however, note that they are also seeing increased use of some quality practices. Focus group participants most commonly highlighted the use of a *driving question* and the provision of opportunities for *student voice and choice* as areas in which they were already seeing growth in quality design during Year 1. Although the perception that teachers are increasing their use of *driving question* parallels the project plan analysis findings, this is not supported by the teacher survey results.

> *This year, I had more student input [and] more student feedback than I ever had.* (MSD focus group participant)

> *Typically, you have a scope and sequence; you have a curriculum you have to follow. And sometimes, the kids have better ideas … So that was a change for me, having them lead the topic—which I loved.* (PCW focus group participant)

Those [teachers] who do projects need to kind of shift more into the HQ section of it, and then those that do the dessert projects need to shift into the project-based stuff. We're developing a system now to enable more projects. (MSD focus group participant)

Deeper Learning Outcomes

In Year 1, student surveys were not administered in PCW. Therefore, we focus below on relevant findings from the educator focus groups, as they are the only cross-school system results available on deeper learning. Results from MSD student surveys are reported in Chapter 2.

In focus groups, educators described increased student engagement and deeper learning through projects, especially in critical thinking and communication. Across all focus groups, participants described increases in student engagement, such as students' interest in, motivation for, and enjoyment of learning, as the primary outcome of scaling PBL. Focus group participants cited this outcome at least twice as often as any other student outcome associated with PBL.

It's a motivational piece. We have so many kids failing because they just are not engaged. That is our biggest issue—it's student engagement. I think what we're finding is that for some of these kids, this is what engages them—the hands-on … group work. (MSD focus group participant)

What I've learned from doing PBL every year is that students really do step up to the plate … we can see the pride in their faces when they have that final product and then while they're sharing it with community and family members. (PCW focus group participant)

Overall, participants discussed increased communication, critical thinking, and collaboration at similar frequencies across the focus groups, with some differences in priority by school system. To a lesser degree, they described changes in mastery of core content and collaboration. Across both school systems, focus group participants often observed increases in students' capacity for independent thinking and independent work. This aligns with the project plan analysis results, in which critical thinking/problem-solving was cited as a success skill learning goal in over three-quarters of the plans.

I'm astounded by the complexities, the questioning, the thought process that kids bring to the table. (PCW focus group participant)

It was just interesting to hear a high level of discussion and critical thinking that had nothing to do with me; it had all to do about them. (MSD focus group participant)

[Students] learned to critique but be compassionate and kind … they learned how to be more respectful, I think, with each other and so helpful—but in an honest way. You know, not just, "Oh, that's pretty" [but] "You know, I like this, but did you consider this?" But, I mean, that took three quarters to get to. But, yeah, they were very self-running. I didn't need to be there. (PCW focus group participant)

With less frequency, focus group participants offered examples of how PBL helped students master core content. Some participants did speak to how PBL was especially effective for supporting the academic progress of English learner students and students with special needs. Teachers and leadership team members from both school systems also indicated that PBL helped increase community connections in terms of providing opportunities for families and other community members to interact with students about their learning.

> *My more struggling learners—they really kind of excelled [with PBL].* (PCW focus group participant)
>
> *The classrooms where students are involved in PBL—already their scores are higher, [and] their failure rates are lower.* (MSD focus group participant)
>
> *It's the real-life piece [that motivates students] … One of the students just chose to do a pamphlet [on] the dangers of vaping. And she wants me to be able to have that available for parents, which I'll do after she's done …* (MSD focus group participant)
>
> *[With PBL], the parents were more knowledgeable about what they were doing in their classroom—not only my stuff but all our departments.* (PCW focus group participant)
>
> *It's not just an assignment that is completed and done, but it might live on to serve the purpose of informing the school community about the multicultural and multilingual assets of those students.* (MSD focus group participant)

Research Question 2:
How does quality PBL scale and spread within and across schools?

The results below are primarily based on reports from teacher survey respondents (N = 582) of school-level system conditions and professional networks for 2018–19 school year. We received surveys from 29 percent of MSD teachers (298) and 30 percent of PCW teachers (294). Findings from educator focus groups (N = 54, with 22 from MSD and 32 from PCW) provided more nuanced information about school-level system conditions and teacher networks as they relate to the diffusion of PBL.

System Conditions

PBLWorks trains leadership teams on strategies for fostering the school-level conditions that foster deeper learning and PBL. These conditions include culture, capacity building, continuous improvement, and vision. Below, we present teacher survey results regarding the degree to which teachers agreed that conditions for culture and capacity building were present in their school, both generally and for PBL. We also report themes from educator focus group discussions of how system conditions more broadly facilitate or constrain PBL in their schools.

Enabling Conditions for PBL

Looking at teacher survey results from MSD and PCW combined, teachers most frequently agreed that the following system conditions for culture and capacity building were in place to support adoption of PBL in their schools:

1. Having a **school administration that supports teachers in trying new practices** (77 percent)
2. Having **colleagues who are willing to collaborate** and share ideas (70 percent)
3. Having **access** to quality **professional development** (62 percent)

In both MSD and PCW focus groups, educators spoke most frequently of system conditions related to culture. The two school systems varied in terms of the frequency with which educators offered examples of how their schools were creating the conditions of capacity building, vision, and continuous improvement. Below, we discuss in more detail the high-level themes from the survey and focus groups related to these enabling conditions for PBL.

Teacher survey respondents reported high ratings for school administrators who supported teachers in trying new practices, both in general and for PBL. Specifically, 74 percent of teachers agreed that their administration supported them in trying new practices generally, and 77 percent agreed or strongly agreed that their administration supported them in trying new practices related to PBL.

This survey finding aligns with key themes from the focus groups related to the system conditions of *culture* and *vision.* First, participants said administrators enable PBL by providing structural support, demonstrating commitment, and communicating a growth mindset. They also said teachers flourish when they receive dedicated time for planning, collaborating, and teaching with PBL. Finally, participants said administrators need to communicate an integrated vision for PBL as central to school and district goals. Educators in both school systems said schools varied in terms of their readiness of having a vision and culture in place for PBL.

> *Whatever happens at a school or doesn't happen, it's because of how much support that effort [is] given by the administration … it's having [the] opportunity to talk to [and] access the coaches to plan during teacher articulation time … even financial resources to purchase certain materials for projects.* (PCW focus group participant)

> *We had people from the district office that volunteered … We had members of the community for our second project come in and speak to the kids. Our principal was always coming down and checking on things and asking about the project … We went on a field trip recently—it was from our PBL, and we had parents come along. We had a lot of support.* (MSD focus group participant)

Over 70 percent of teachers felt they had colleagues who were willing to collaborate and share ideas but did not believe they had an adequate amount of time for collaboration, both generally and for PBL. Overall, 77 percent of teachers agreed or strongly agreed that they had

colleagues who were willing to collaborate for general teaching, and 70 percent agreed or strongly agreed that they had colleagues who were willing to collaborate for teaching PBL. Fewer respondents agreed or strongly agreed that they had an adequate amount of time to collaborate generally (40 percent) and about PBL (35 percent).

Focus group participants also discussed the importance of conditions related to *capacity building,* especially professional development, and *continuous improvement.* These educators said training and tools develop a common language and encourage experimentation. In addition, they said coaching builds confidence and helps teachers get to higher levels of quality. They also said leaders aim to strategically build "pockets of expertise" in schools so that "credible" teachers can model PBL and serve as a resource.

> *So, we had the workshops, then we had the planning time that was given to us, and the people that we were incorporating [PBL] also had the same planning time, so we all came together. A few were elusive until somebody said, "You need to be at these meetings. This is mandatory." So, I thought that was huge—and even the coaches just checking in, constantly checking. "Where you at? What's going on with this?"* (MSD focus group participant)

> *They [school personnel] really need to have that dedicated time to talk about PBL … it can't just be an open talk about what you want … having that focus is kind of key to being able to spread this practice.* (PCW focus group participant)

Challenges for PBL

Making teacher-teacher connections can be a challenge. Focus group participants said leaders need to provide structured time and protocols to encourage collective reflection, mutual learning, and continuous improvement.

Looking at survey results for MSD and PCW combined, the three lowest-rated system conditions for teaching with PBL in Year 1 were:

1. Having an adequate amount of **time for collaboration** (35 percent)
2. Receiving **ongoing coaching and feedback** (34 percent)
3. Having an adequate amount of **planning time** (34 percent)

Compared with teaching in general, teachers did not have adequate time for planning and teaching PBL. In total, 50 percent of teachers agreed or strongly agreed that they had adequate planning time generally compared with 34 percent for PBL. Similarly, 64 percent agreed or strongly agreed that they had adequate teaching time generally compared with 42 percent for PBL.

Focus group participants echoed these concerns, especially the lack of time to plan, collaborate, and teach with PBL.

> *If they don't give us the dedicated time, it doesn't matter how good whatever program it is. If we cannot … put it together with fidelity, it's just another program that they gave us.* (PCW focus group participant)

> *Our leadership team probably doesn't meet as much as we should. We usually come together at those [PBLWorks] meetings, and then we will connect through email. We do a lot of work together through email. We've had very limited time to work together.* (MSD focus group participant)

Teachers rated ongoing coaching and feedback as low, both for their general teaching and for teaching PBL. Only 38 percent of teachers agreed or strongly agreed that they received ongoing coaching and feedback for their general teaching, and 34 percent agreed or strongly agreed that they received ongoing coaching or feedback for teaching with PBL.

Along those lines, some focus group participants proposed that implementation of PBL without formal training or coaching may not be high-quality or sustainable, given the degree that PBL challenges conventional teaching norms. In addition, focus group participants highlighted a need for more organized information, such as a platform for sharing projects, and project coordination from their school system regarding PBL.

> *I would like to spend more time on the actual instructional practices that go along with [PBL]. We've got the structure down, we know the different pieces, but I think that's what will transform the teaching.* (MSD focus group participant)

> *I think one of the challenges with the coaches is that they're kind of on the same level as the teachers.* (PCW focus group participant)

Diffusion of PBL

Focus groups with educators provided insight into the strategies MSD and PCW used to address these system conditions and promote the diffusion of PBL within and across schools.

Administrators and leadership team members used various intentional diffusion strategies, mainly focused on the compatibility and trialability of PBL. Most often, these strategies highlighted the *compatibility* of PBL with other goals and initiatives, with PBL framed as a strategy to realize goals teachers already care about. Messaging and coaching were the main vehicles for this, which focus group participants felt were important for educators across the adoption continuum. They also described strategies focused on *trialability*, that is, outfitting teachers with a basic orientation to PBL concepts and bolstering their confidence to try PBL. Training was the main vehicle for this, supported by messaging and strategies, such as joint projects. This strategy was especially important for "nervous" teachers.

To a lesser degree, schools took steps to reduce *complexity*, mainly through tools and templates, as well as by talking about how PBL is "not new" but "just good teaching." Although they are

not yet commonly used beyond activities facilitated by PBLWorks, focus group participants expressed a desire to implement more strategies to promote *observability* in and across schools, mainly through gallery walks, presentations of learning, and leadership walks. Talking about increased student engagement and teacher enthusiasm appeared to be the main way participants communicated the *relative advantage* of PBL over traditional teaching.

Signs of Progress in Scaling PBL

Across both school systems, educators most frequently described changes in *teacher practice* in terms of increased use of Gold Standard Design Elements as the main sign of progress in scaling PBL across their schools. The next most common sign of progress associated with PBL was *increased connections* among educators, followed by *increased educator engagement* in PBL, and changes in *teacher mindset*. We discuss these themes in more detail below.

Overall, focus group participants said there is growing excitement about and engagement in PBL among educators in their school system. They also said the quality of training generates "momentum" among teachers, as demand for more training is high among educators. Administrators also said interest in PBL is spreading in their schools, saying that "you don't have to push it" and "teachers are running with it." Although teachers were reportedly were nervous to facilitate PBL at first, their confidence and enjoyment have grown with experience.

> *Everybody was excited to jump on board … you haven't seen that kind of energy and excitement in a while.* (MSD focus group participant)
>
> *I really am invested in this. I really see a difference with my kids even this year.* (MSD focus group participant)
>
> *… [T]he students are more engaged; they're more excited. They love PBL. The teachers enjoy it, like, even though it's a lot of work for them … There's more buy-in, I think, from [teachers] now that they [have] finished one or two projects.* (PCW group participant)
>
> *I'm not hearing negative comments … I hear a lot of things about the time it takes to do the projects, but I guess the responses from the students were really positive, and that has helped to drive the remainder, for the most part—the other staff members getting on board.* (PCW focus group participant)

Focus group participants said teachers were shifting their mindsets, as well as their practices. They commonly described PBL as a "student-centered approach" that required teachers to "learn to let go" of traditional notions of teacher-centered instruction. In both school systems, teachers reflected on how facilitating PBL shifted how they thought about their role as teachers, especially a need to get more comfortable with talking less, making mistakes, and learning alongside students. Focus group participants also offered examples of how Gold Standard Design Elements—especially *public product*—shifted how they or others think about students' capacities, as students had surpassed expectations.

I still teach the same way I've always taught, but with the PBL, it's a lot more trust in the students, and it's a lot less [of a] role for the teacher. You have to trust them that they're going to stay on task and manage themselves when you're not necessarily sure they will. That was a big difference to me. (PCW focus group participant)

Teachers kind of had a switch in thinking, where they might have not thought kids could do certain things. And they were certainly surprised at what the students are able to produce, even if it wasn't, like, the winner, or it was that process that they went through, that kids are thinking a lot higher (PCW focus group participant)

It's a lot of work upfront but so much less work for me during the class—I'm able to facilitate rather than pour things into heads and get them back in tests. My kids are very creative, very enthused, very excited, very self- motivated [and] self- starting. (MSD focus group participant)

My focus is English language learners, and I see the benefits there … I think students are more engaged, and they have that opportunity to work in small groups, which we didn't always see in the past. They have more opportunity for language output and to work with peers who are both language and academic models … A lot of the EL teachers and students have been rock stars with PBL, and it's really put them in the center of learning … that they're really in the heart of the city. (MSD focus group participant)

Role of Networks in Diffusion of PBL

Across all focus groups, participants identified new connections among educators related to PBL. Teachers highlighted the value of sharing ideas and lessons learned with colleagues both in their schools and from other schools during the trainings. They offered many examples of new collaborations within grades and across content areas regarding project design and/or facilitation. A few said PBL opened possibilities for more vertical alignment, in terms of thinking about the progression of skills across grade levels. A couple offered examples of school-to-school collaboration on projects, but the SNA results indicated these connections are limited.

Having those other brains and ideas to bounce off of was amazing. To hear how some other schools who've been doing it for a little while—"Oh, OK, give us some ideas here." That was great to hear—"This didn't work" or "Try that." (MSD focus group participant)

I'm now seeing [teachers] reflect on their teaching practices much more than they were before … and it's like … eighth grade is kind of talking to sixth grade about it, like, "This is what the eighth-graders need to be able to complete some of these projects, and here's skills they need in sixth grade." So, some of that's happening, which I think is really positive. (MSD focus group participant)

What I really did appreciate was when we did that articulation across the school … it kind of guides us when we're having our discussions; we're not in it alone. (PCW focus group participant)

> *We crave those connections, and I think [PBL] has really opened up a serious avenue to make those connections from school to school and from teacher to teacher and child to child.* (PCW focus group participant)

Focus group participants expressed strong appreciation for being part of a school system-wide cohort, saying "we're all in this together." Participants also highlighted efficiency gained from having schools all work on the same initiative, that is, sharing lessons learned and "not re-creating the wheel" regarding design, training, and identifying community partners.

> *With all of us in Manchester attacking this initiative, it was kind of interesting when you would go to the different PBL meetings … working with other teachers across the district was so incredible … You can see [a joint project] literally not just between classes in one school … you can actually see it going from the elementary school to a middle school to a high school.* (MSD focus group participant)

> *There's some shared ownership over this. It's not just a complex area initiative. It's something that … schools are really saying as part of … who they are.* (PCW focus group participant)

Diffusion did not appear to be occurring systematically through teacher connections with PBL 101 participants. According to the SNA results, teachers who were tied in the social network to another teacher in Year 1 who participated in PBL 101 were not significantly more likely to see a change in the number of projects taught from baseline to Year 1, a change in the number of projects over eight hours, or a change their project quality.[16] One exception was for MSD Cohort 1 schools, where teachers who identified or were identified by another teacher who participated in PBL 101 were significantly more likely to have done a project in Year 1 than teachers who were not. There are notable differences between the two school systems in terms of how often PBL 101 participants were identified by others in the network (i.e., centrality), as well as the status and behavior of teachers who were identified by schools as PBL early adopter opinion leaders at the start of the project, which limits our ability to draw conclusions across the two school systems.

In both open-ended survey responses and focus groups, participants cited challenges associated with spreading quality PBL to teachers who had not received formal training or coaching. Although focus group participants shared powerful experiences of peer-to-peer sharing and modeling regarding PBL practices, they often noted challenges in terms of time, structure, and support for implementation. Survey respondents said that when they were going to another individual for advice about PBL, they were more likely to interact with those individuals in formal settings. This was reflected in both focus groups and open-ended survey responses in which participants described how teachers supported one another in PLCs, as well as grade- and school-level staff meetings. However, in 34 open-ended survey responses (8

[16] Only a small number of teachers responded to both the baseline and Year 1 surveys (MSD: 210, 29 percent; PCW: 208, 29 percent). Thus, little can be concluded about what these small trends mean for the overall systems.

percent of 400 responses received), participants discussed how teachers did not feel supported to try PBL without training, suggesting a need to better understand how to support diffusion at the school level.

> *We did not have any supports. Only a small group of teachers were sent to training this year. Otherwise, we have not been told anything, other than we will be using PBL, and [we] received some handouts.* (MSD teacher survey respondent)

> *PBL was rushed in our school. PBL requires a large amount of time to learn and to plan for effectively. Our school pushed the initiative in a few staff meetings and gave a crash course. Many staff were reluctant to participate, and the PBL "workshops" in our staff meetings were not effective.* (MSD teacher survey respondent)

> *At our school, we have an action group for PBL. However, when they attend a training session, nothing is shared with the entire faculty … This I find hard to understand.* (PCW teacher survey respondent)

> *The only useful support I got was the training or the encouragement from my department head. I tried to get support from my leadership team and followed procedures … but got nothing.* (PCW teacher survey respondent)

Chapter 2. Manchester School District Results: 2018–19

In this chapter, we present results for each research question specifically for MSD. We start with results related to research question 1: *To what extent do students, including students furthest from opportunity, experience two high-quality projects each year?* We present data regarding project facilitation; project quality; and deeper learning from the teacher survey, class rosters, educator focus groups, project plans, and student surveys. Next, we examine research question 2: *How does quality PBL scale and spread within and across schools?* We draw on the teacher survey and educator focus groups to report on findings related to system conditions and teacher networks and how they may relate to the diffusion of quality PBL.

This chapter draws on results from the teacher survey (298 MSD teachers responded), the matching of class rosters with teacher surveys (rosters were matched for 10,669 MSD students), analysis of 11 project plans from MSD teachers, the student survey (551 MSD students in grades 4–8 responded), and educator focus groups (22 teachers and administrators participated). See the technical appendix for more details on these samples.

Project Facilitation, Quality, and Deeper Learning

Project Facilitation

In this section, we discuss the number of projects teacher survey respondents reported facilitating in spring 2019. Next, we discuss the percentage of students who experienced these projects based on matching class rosters with teacher survey results.

Number of Projects Facilitated by Teachers

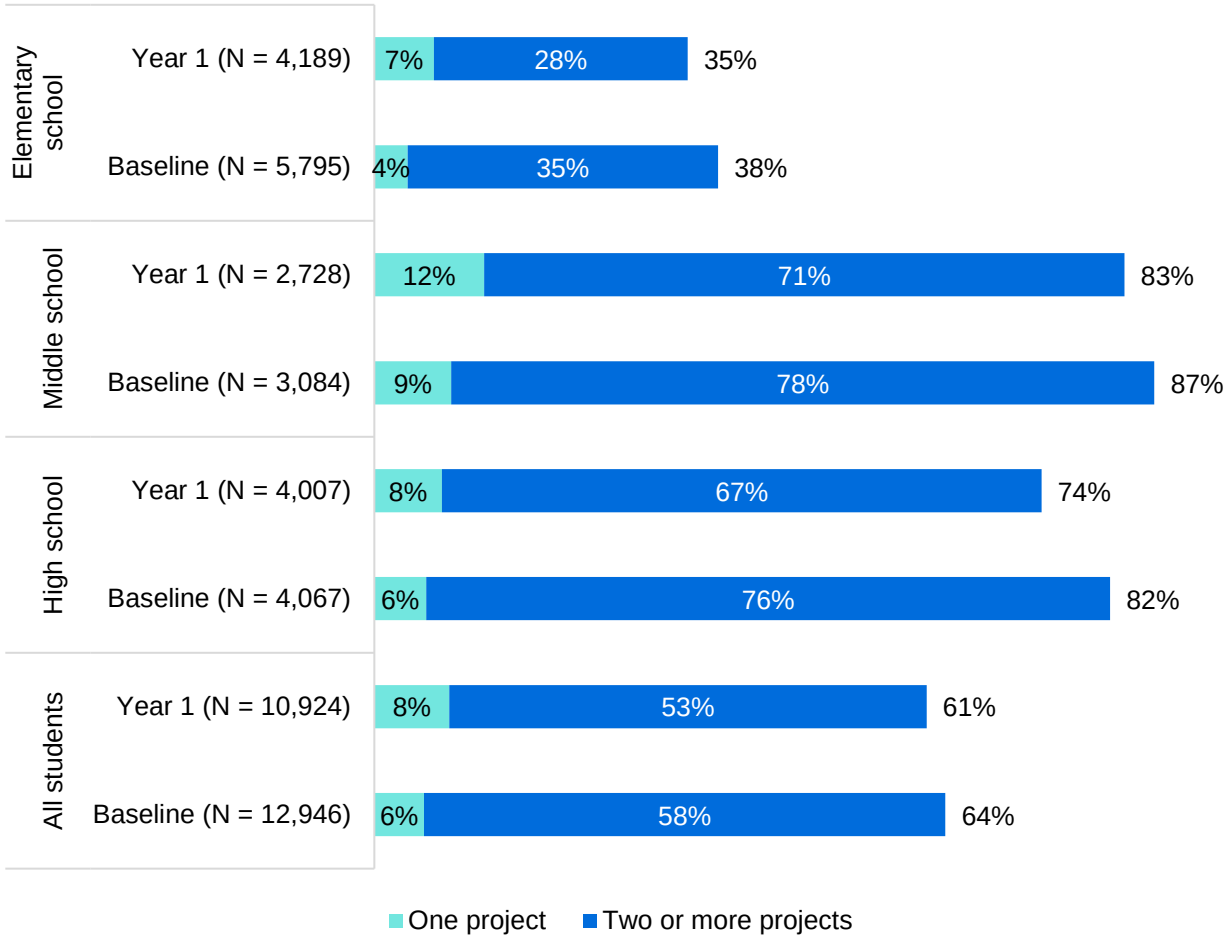
Overall, 59 percent of *teacher* survey respondents reported teaching a project during Year 1, with higher rates that were significantly different for Cohort 1 schools and PBL 101 participants compared with Cohort 2 schools and teachers who did not participate in PBL101. Among Cohort 1 schools, 68 percent of respondents reported teaching a project compared with 45 percent of respondents in Cohort 2 schools. In addition, 93 percent of respondents who were PBL 101 participants taught a project compared with 45 percent of respondents who did not participate in PBL 101.

In total, 32 percent of *teachers* reported an increase in the number of projects taught from baseline to Year 1, with 17 percent teaching a project during Year 1 who did not teach a project at baseline. There were no statistically significant differences in the change in the number of projects taught from baseline to Year 1 by any school- or teacher-level characteristics.

Number of Projects Experienced by Students

Overall, 61 percent of matched *students* participated in at least one eight-hour project, which is 2 percentage points lower than at baseline.[17] The percentage of students participating in two or more projects also declined from 2017–18 to 2018–19. The percentage of students participating in projects was higher in middle schools and high schools than in elementary schools (figure 4).

Figure 4. Percentage of MSD students who experienced eight-hour projects overall by grade band, Year 1 and baseline



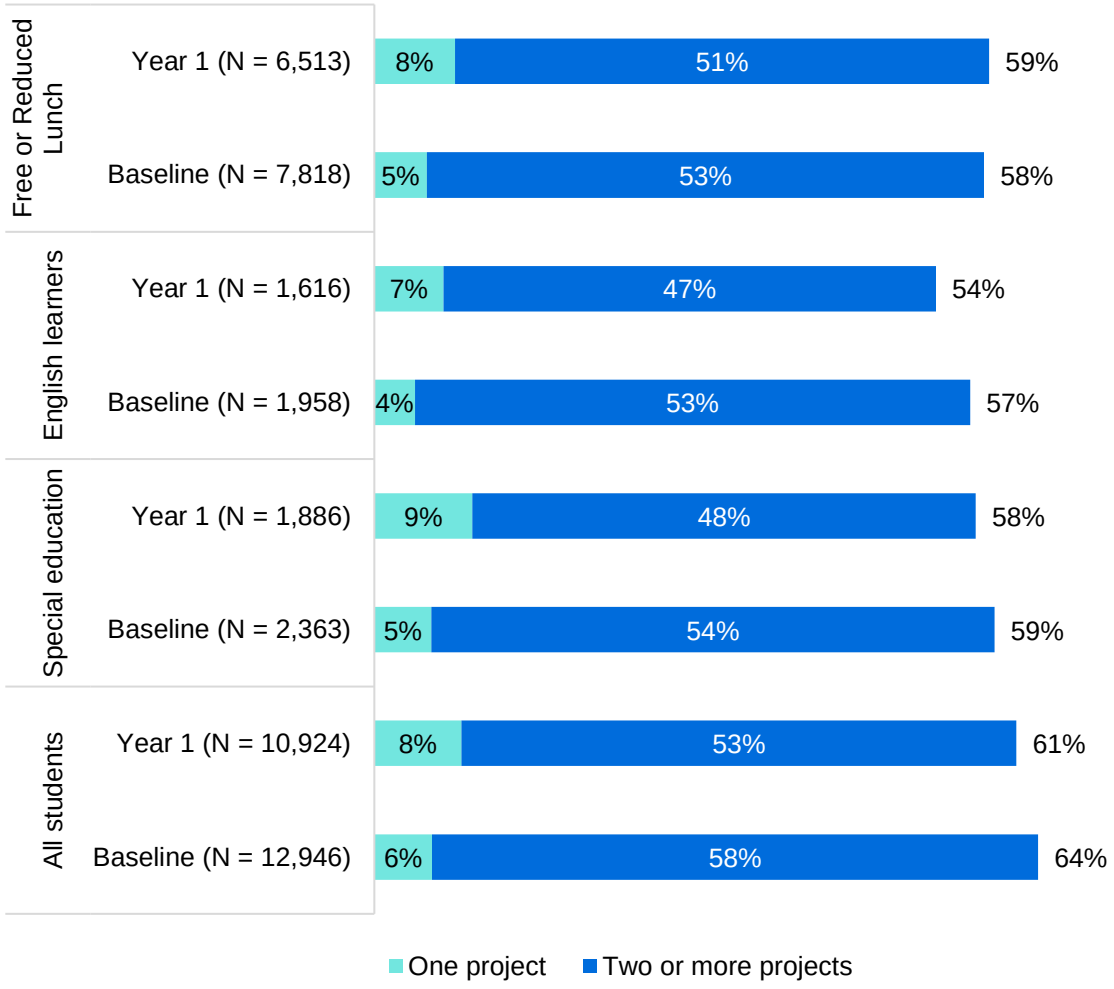
Note: Some percentages may not add up to the listed total due to rounding.

Source: Education Northwest analysis of teacher survey data matched to student roster data.

[17] Percentages are based on the number of students who could be matched to a teacher survey response.

English learner students, students receiving special education services, and students eligible for free or reduced-price lunch were less likely to experience two or more eight-hour projects in Year 1 compared with students overall. Participation in two or more projects was 6 percentage points lower for English learner students, 5 percentage points lower for students receiving special education services, and 2 percentage points lower for students eligible for free or reduced-price lunch (figure 5). However, when looking at the percentage of students who experienced at least one eight-hour project in Year 1, the trends for these groups are closer to that of the overall population.

Figure 5. Percentage of MSD students who experienced eight-hour projects by eligibility for free or reduced-price lunch, special education services, or English learner services, Year 1 and baseline

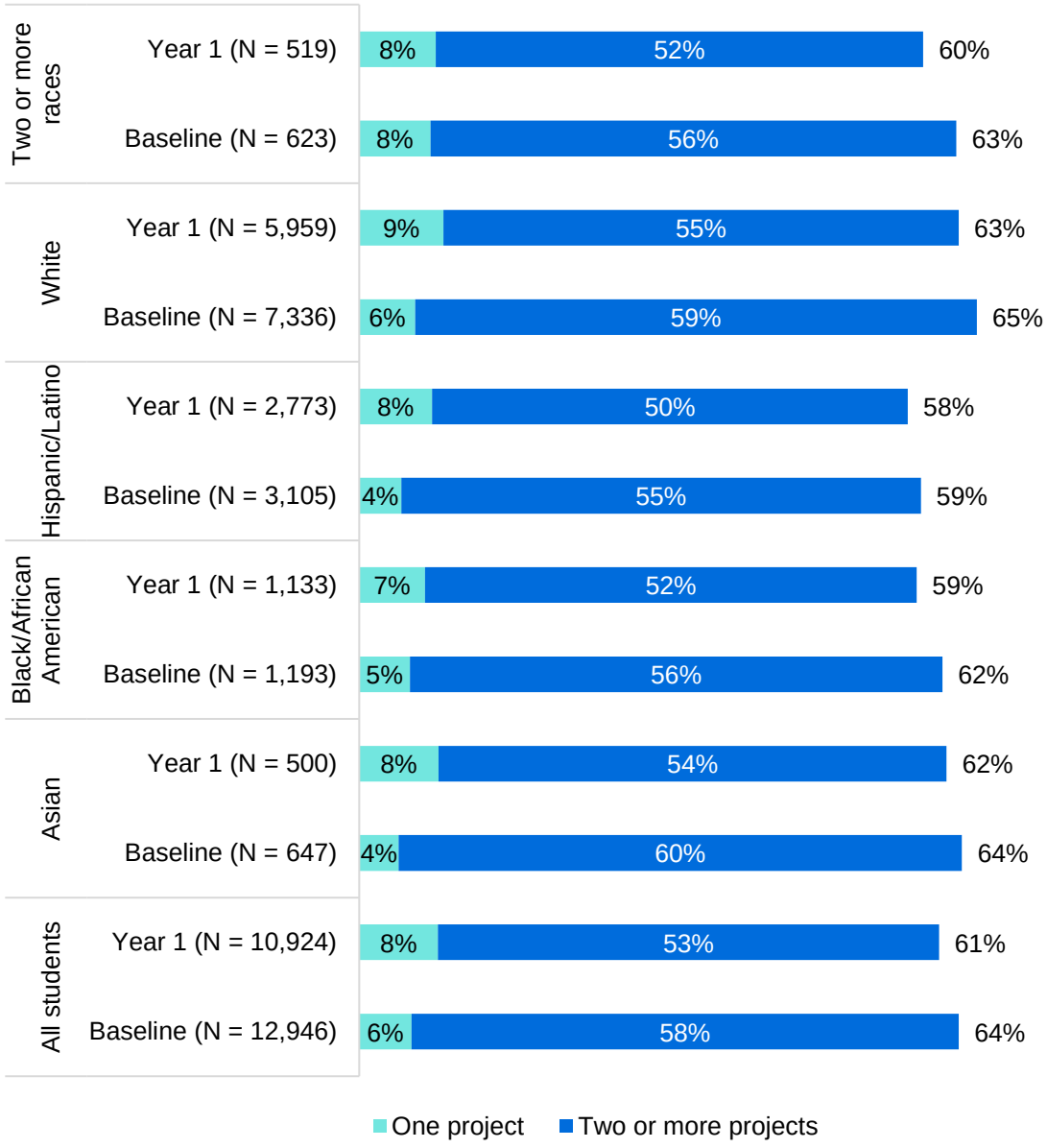


Note: Some percentages may not add up to the listed total due to rounding.

Source: Education Northwest analysis of teacher survey data matched to student roster data.

Students who identified as white or Asian experienced two or more eight-hour projects in Year 1 at a higher rate than for students overall. All other race/ethnicity groups experienced two or more eight-hour projects at a lower rate than all students (56 percent), with Hispanic/Latino students having the lowest percentage of students experiencing projects (52 percent) (figure 6). When looking at the percentage of students who experienced at least one project, the percentage decreased for all groups between Year 1 and baseline.

Figure 6. Percentage of MSD students who experienced projects lasting eight hours or more, by race/ethnicity, Year 1 and Baseline

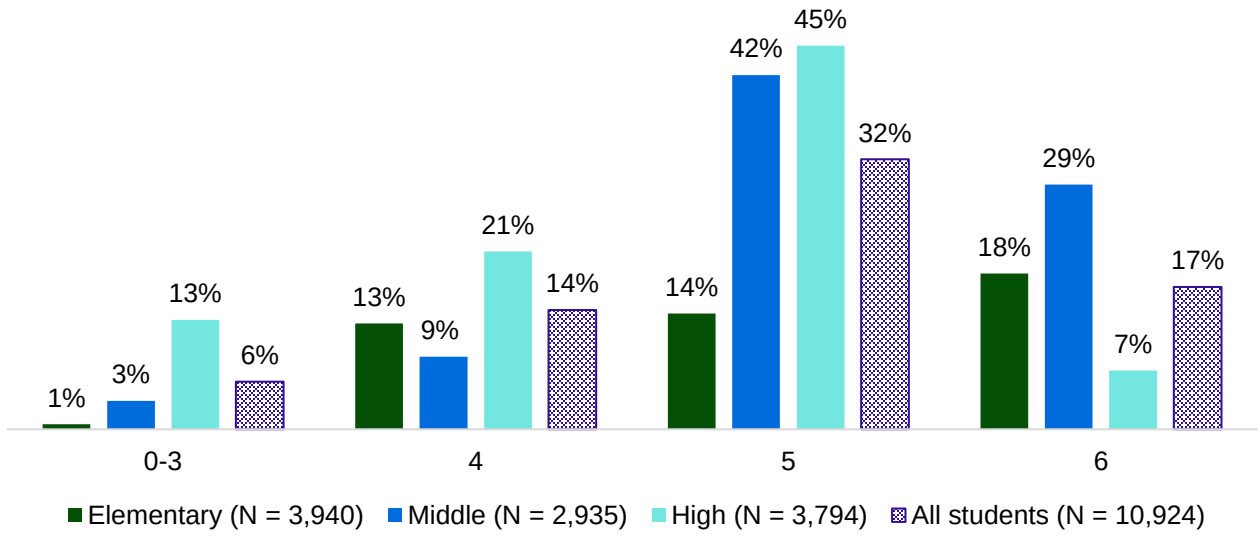


Note: Some percentages may not add up to the listed total due to rounding.

Source: Education Northwest analysis of teacher survey data matched to student roster data.

Overall, 63 percent of students experienced projects with at least four of the six Gold Standard Design Elements measured, and 49 percent experienced projects with five to six. Teacher survey data on project quality were matched to the student rosters. In total, 71 percent of matched students in MSD (7,525 of 10,669 students matched overall) were matched to a teacher survey that had a quality score for a project. Figure 7 shows the percentage of students with a teacher who had an overall quality score of 0 to 6. We did not receive teacher reports of project quality for 29 percent of matched students overall, including 54 percent of elementary students. The projects matched to teachers and students had an average score of 4.9 on a scale of 0 to 6, meaning, on average, projects met five Gold Standard Design Elements.

Figure 7. Percentage of MSD students who experienced projects with zero to six Gold Standard Design Elements by grade band based on teacher reports, Year 1



Note: Some percentages do not add up to 100 because project quality data were not provided by some teachers.

Source: Education Northwest analysis of teacher survey data matched to student roster data.

A much higher percentage of students in middle school experienced high-quality projects than students in elementary school or high school. Overall, 71 percent of middle school students experienced projects that had five or six of the Gold Standard Design Elements compared with 52 percent of high school students and 32 percent of elementary school students (see figure 7).

The differences between English learner students and non-English learner students, as well as students receiving special education services and those who were not, were small when looking at the percentage of students who experienced high-quality projects. On average, the differences in average project quality score was less than 0.1 on the scale of 0 to 6 for both student groups. Fewer students eligible for free or reduced-price lunch experienced projects with at least five of

the six design elements measured compared with students who were not eligible for free or reduced-price lunch (48 percent and 51 percent, respectively).

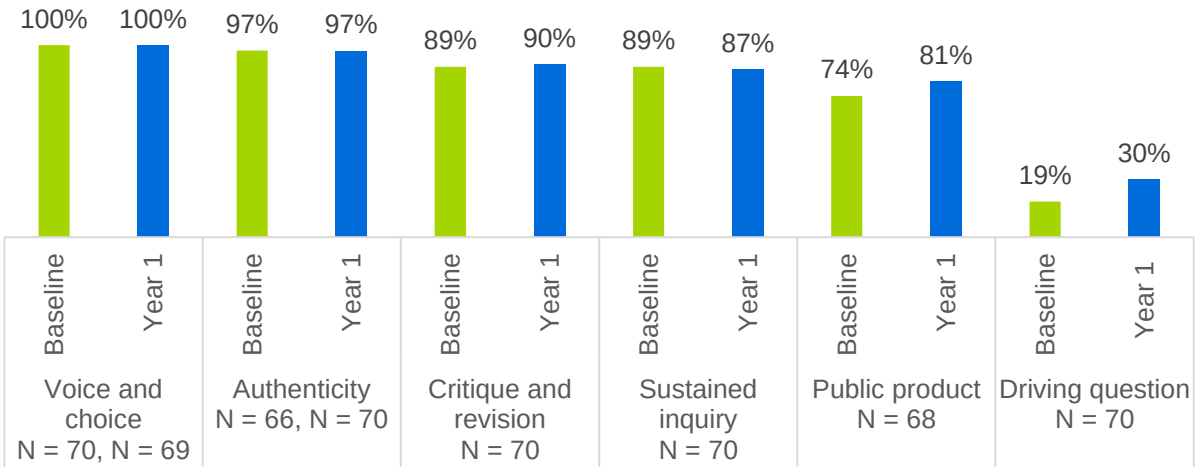
Project Quality

Teacher-Reported Use of Gold Standard Design Elements[18]

In Year 1, we received project quality data from 152 MSD teachers, 70 of whom completed both the baseline and Year 1 survey.

In Year 1, 68 percent of teachers said their spring 2019 projects met the quality threshold for at least five of the six Gold Standard Design Element measured, with few projects meeting the threshold for *driving question*. PBL 101 participants were significantly more likely to meet the minimum quality threshold for *driving question*, *sustained inquiry*, and *public product* than teachers who did not participate in PBL 101(figure 8).

Figure 8. Percentage of MSD teachers with projects meeting the quality threshold for each Gold Standard Design Element based on teacher reports, baseline and Year 1

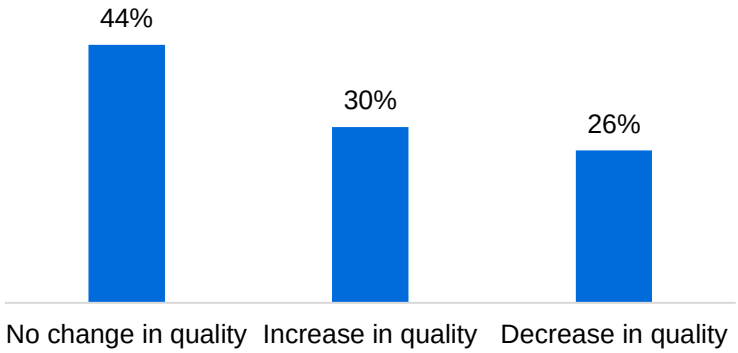


Source: Education Northwest analysis of teacher survey data.

Although overall quality scores did not change significantly since baseline, the largest increases in quality were for *public product* and *driving question*. Average baseline quality was 4.63, ranging from 2 to 6, and average Year 1 quality was 4.8, ranging from 3 to 6. This indicates that both at baseline and during Year 1, on average, the projects met four to five of the six design elements measured on the teacher survey. There were no statistically significant differences in change in quality over time based on school cohort or teacher PBL 101 participation (figure 9).

[18] As discussed in the introduction, the teacher survey measured six of the eight Gold Standard Design Elements. The survey did not measure reflection or student learning goals.

Figure 9. Percentage of reported change in overall project quality score based on teacher reports from baseline to Year 1 in MSD (N = 70)



Source: Education Northwest analysis of teacher survey data.

Evidence of Gold Standard Design Elements in Project Plans

All MSD project plans involved sustained inquiry regarding a *challenging problem or question*, and many met the threshold for *student learning goals* and *public product*. These findings mostly align with reports of project quality on the teacher survey. Overall, 73 percent (eight) of MSD unit plans explicitly stated at least one success skill they expected to focus on, mainly *critical thinking* (eight) and *collaboration* (five). For example, one grade 8 project plan was organized based on the driving question: *How do we determine whether or not [our school] is running the most efficient irrigation system*? The plan included learning goals related to multiple math standards in addition to a focus on critical thinking and collaboration. Students researched types of sprinkler heads for efficiency and cost, and then they determined which irrigation system is most efficient. This project also used real-world processes; students visited their school's sprinkler system as part of their research, and the project culminated in a public product delivered to the Public Works/Building Maintenance Department of the school.

Table 2. Percentage and number of analyzed plans across MSD that met the quality threshold for each of the eight Gold Standard Design Elements (n = 11)

Gold Standard Design Element	Percentage of plans that met the threshold
Challenging problem or question	100% (11)
Student learning goals	91% (10)
Public product	82% (9)
Sustained inquiry	100% (11)
Reflection	73% (8)
Critique and revision	64% (7)
Authenticity	55% (6)
Student voice and choice	36% (4)

Source: Authors' analysis of project plans submitted with teacher surveys.

Among the MSD project plans analyzed, 55 percent addressed *authenticity*, and 36 percent provided opportunities for *student voice and choice*. Five plans that addressed authenticity included the use of real-world tools, processes, or quality standards. Three plans included opportunities for students to explore their own interests and identities. One plan addressed a real-world impact. All four plans with *student voice and choice* in the design included opportunities for students to choose what they learned (e.g., choose a hero from Greek mythology to study), but none included opportunities for choice in how they learned. These findings do not align with overall findings from the teacher survey; close to 100 percent of teachers reported that their projects met the threshold for quality for these two design elements.

Student-Reported Experiences of Quality PBL

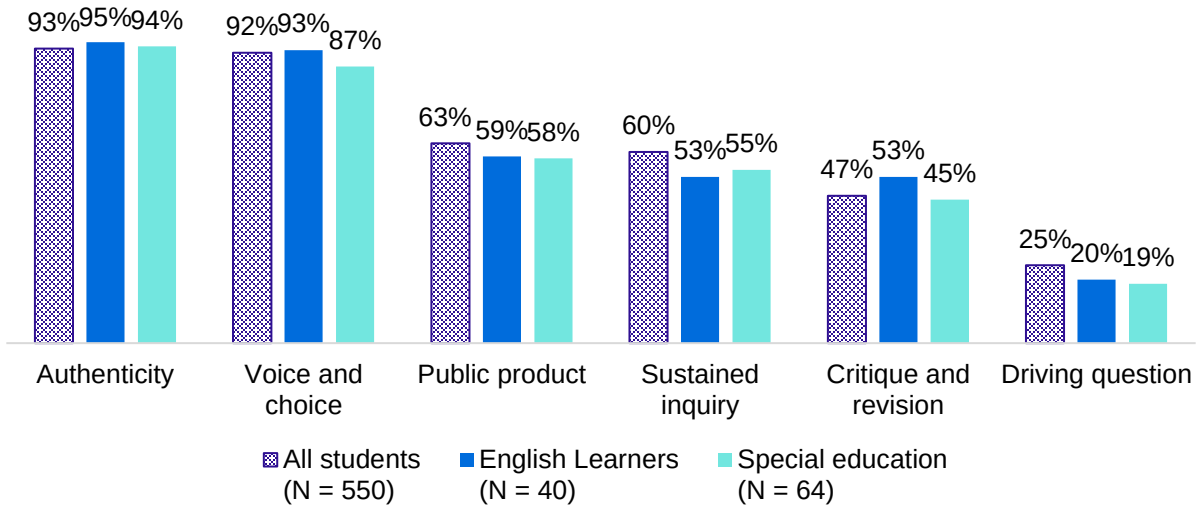
In their survey, students were asked to report on the quality of the project they recently completed in class.[19] We created an overall quality measure to facilitate triangulation with the teacher survey results (see appendix A). The findings below discuss student reports of quality in relation to teacher reports of quality for the six Gold Standard Design Elements measured in the teacher survey. Student survey data are available for only MSD in Year 1 and are not available for PCW.

Over 90 percent of student survey respondents reported that they experienced projects that met the threshold for *authenticity* and *voice and choice*. About 60 percent of students said their projects met the threshold for *public product* and *sustained inquiry*, but less than 50 percent said their project met the threshold for *critique and revision*. The latter result does not align with the teacher survey, in which 90 percent of projects reportedly met the threshold for quality *critique and revision*. Only 25 percent of students said their projects met the threshold for *driving question* (figure 10), which aligns with the teacher survey results, which indicated that *driving question* was the least prevalent design element.

Experiences of quality projects varied somewhat by student groups. Compared with middle school students, more elementary school students reported projects with *sustained inquiry* (66 percent versus 57 percent) and *critique and revision* (52 percent versus 44 percent). In addition, the percentage of English learner students who reported experiencing projects that met the threshold for *critique and revision* was 6 percentage points higher than the overall average. However, a smaller percentage of English learner students and students receiving special education services reported experiencing projects that met the threshold for *driving question*, *sustained inquiry*, and *public product*. A lower percentage of students receiving special education services also reported experiencing projects with opportunities for *student voice and choice* (figure 10).

[19] Although the survey was designed using the HQPBL framework, we focused on analyzing constructs aligned with the six Gold Standard Design Elements measured on the teacher survey: sustained inquiry, driving question, authenticity, student voice and choice, public product, and critique and revision.

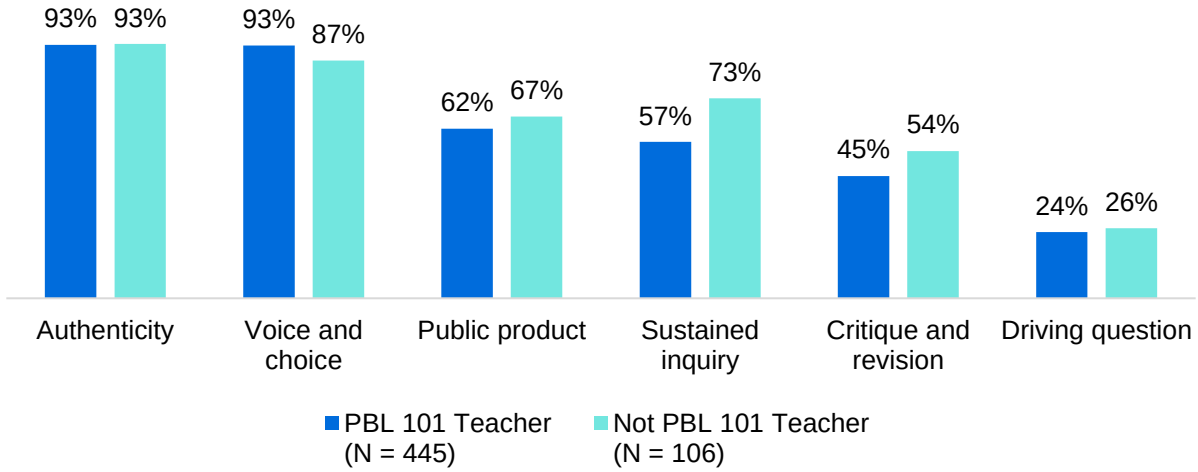
*Figure 10. Percentage of projects for English learner students and students receiving special education services that met the quality threshold for each Gold Standard Design Element based on **student** reports in MSD, Year 1*



Source: Education Northwest analysis of student survey data matched with student roster data.

Students with teachers who had PBL 101 training generally did not report experiencing higher levels of quality than students with teachers who did not participate in PBL 101. Although more than 90 percent of students with PBL 101 teachers reported that they experienced projects that met the quality threshold for *authenticity* and *voice and choice*, fewer did so for *public product, sustained inquiry, critique and revision,* and *driving question* (figure 11). This finding does not align with overall trends in teacher-reported use of Gold Standard Design Elements; projects offered by PBL 101 teachers scored significantly higher in Year 1 than projects offered by teachers who had not received the training.

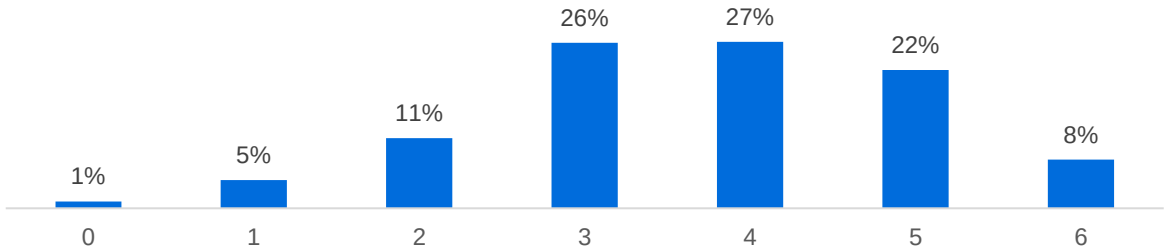
*Figure 11. Percentage of projects that met the quality threshold for each Gold Standard Design Element in classrooms with PBL 101 teachers based on **student** reports in MSD, Year 1*



Source: Education Northwest analysis of student survey data matched with student roster data.

Students most frequently reported experiencing three to four Gold Standard Design Elements (53 percent of students), but all their teachers reported that their projects included four to six elements. Overall, 22 teachers (elementary and middle school only) administered the student survey, and 16 of those teachers also completed the teacher survey. That allowed for the comparison of teacher surveys to student surveys for 83 percent of the completed student surveys. All these teachers ranked their projects as having met the threshold for four or more Gold Standard Design Elements measured (average score of 4.8). On average, the student-reported project quality score was 3.7, indicating that their projects included fewer than four of the six elements (figure 12). There were no major differences between student groups.

*Figure 12. Overall project quality scores based on **student** reports in MSD, Year 1 (N = 551)*



Source: Education Northwest analysis of student survey data.

In open-ended survey comments, students most frequently described collaboration as a feature that distinguished PBL from other learning experiences. Many also wrote about working on a *public product* and experiences of *authenticity* on projects. To a lesser degree, they wrote about intellectual challenge and project management.

> *This project was different from other activities in this school because we got to have partners and got to read each other's work when we were done.* (MSD student)

> *It was different from other learning activities because it really took a lot of time and effort into the projects, so we really had to work on communicating and working together with other students.* (MSD student)

> *We got to work together to solve a problem, and we could actually make an impact with this project. We also got to … talk with an environmentalist, who was helpful, when picking our topics.* (MSD student)

> *This project was different because we went to different classrooms, put posters all around the school, and made money.* (MSD student)

> *Working on this project was different from other learning activities at school because you had to … learn how you can educate yourself and other people. Also, you had to talk about real-world problems and try to make a point go through.* (MSD student)

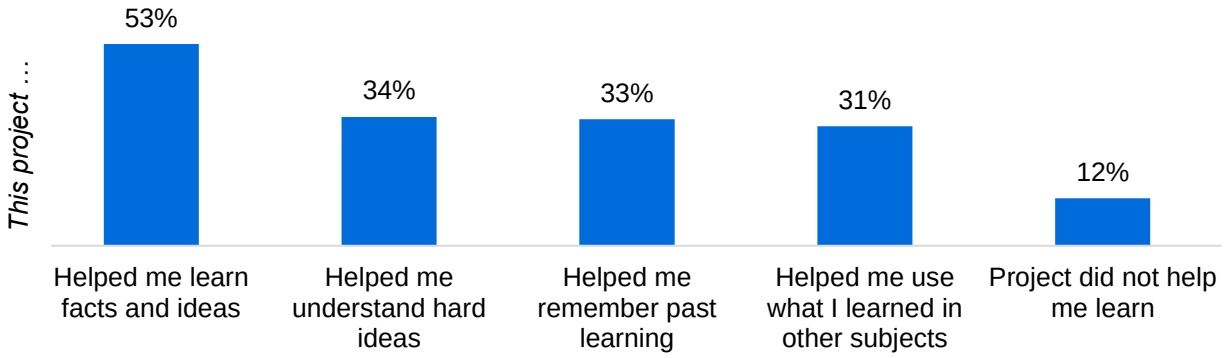
In this project, we were actually going to make a website and posters for around the school so that not only my class could see but the city could see too. (MSD student)

Student Reports of Progress in Deeper Learning Skills[20]

Student survey respondents largely indicated that the project supported their learning of academic content. Overall, 88 percent of students reported that the project helped them in at least one of the four areas related to academic learning on the survey, and only 12 percent indicated the project did not help them learn academic content at all (figure 13). In addition, English learner students[21] reported that the project helped them in all four areas at a higher rate than all students—with the difference being pronounced for "This projected helped me understand hard ideas" (19 percentage points higher) and "This project helped me remember past learning" (14 percentage points higher).

In terms of grade band, compared with the overall population, elementary school students reported at a higher rate that the project helped them in three areas: understanding hard ideas (9 percentage points higher), remembering past learning (15 percentage points higher), and using what they learned in other subjects (8 percentage points higher).

Figure 13. Percentage of MSD students indicating deeper learning of academic content through projects, Year 1 (N = 542)



Note: Students could have selected all or none of the first four responses; 12 percent selected none of these options.

Source: Education Northwest analysis of student survey data.

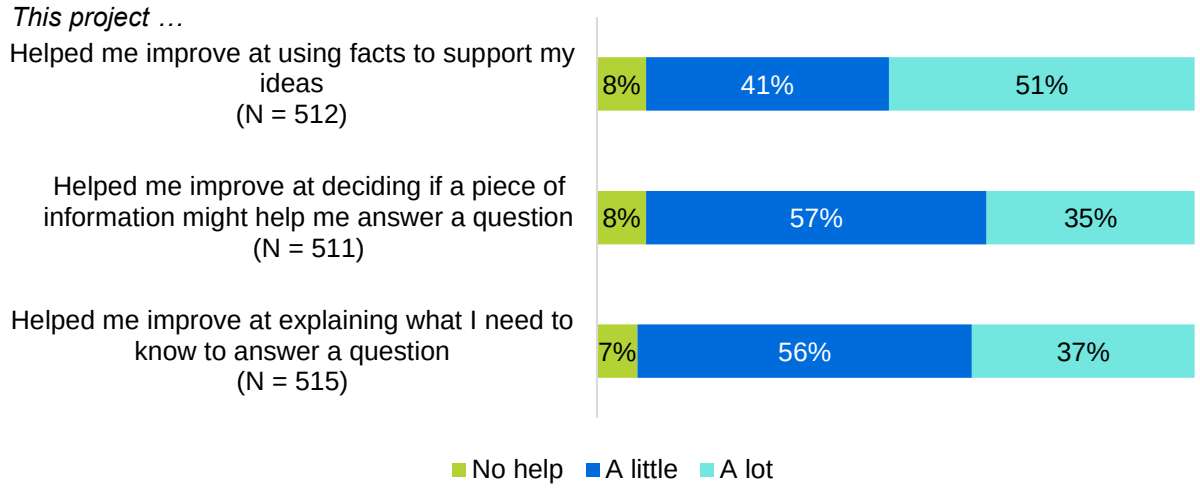
The greatest area of progress students identified was critical thinking, especially using facts to support ideas. Only 3 percent indicated the project did not help them in any of the three areas related to critical thinking on the survey (figure 14). Elementary school students and English learner students reported at a higher rate than the overall population that their project

[20] The findings in this section are based on student survey data. Student survey data are available for only MSD in Year 1.

[21] We recommend caution in interpreting results due to the small sample size of English learners (N=40)

helped them "a lot" in all three areas related to critical thinking. Specifically, among English learner students, 59 percent said the project helped them improve at using facts to support ideas, 56 percent for deciding if a piece of information might help answer a question, and 54 percent for explaining what they would need to know to answer a question. A higher percentage of students receiving special education services reported that the projects "did not help them at all" for all three survey items related to critical thinking.

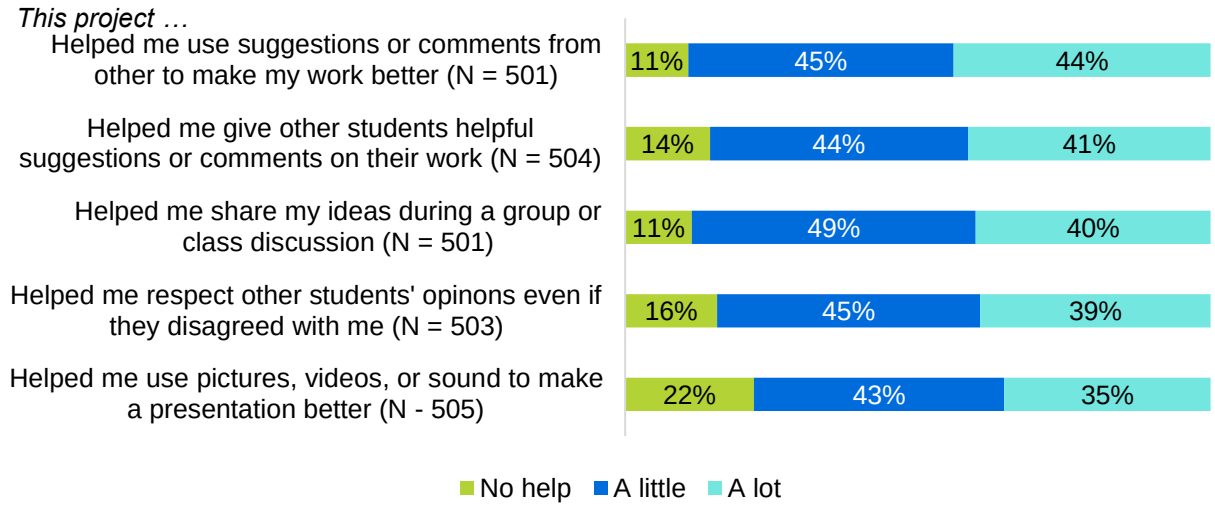
Figure 14. Percentage of MSD students indicating greater critical thinking skills through projects, Year 1



Source: Education Northwest analysis of student survey data.

Overall, 97 percent of students said the project helped them with communication. Students especially indicated growth in their skills related to critique and revision. Only 3 percent of students said the project did not help them in any of the five areas related to communication on the survey (figure 15). Compared with the overall student population, a higher percentage of English learner students said the project helped them "a lot" in each of the five areas. The largest divergence between the overall population and English learner students was for the survey item "This project helped me give other students helpful suggestions or comments on their work," with 61 percent of English learner students marking "a lot" of improvement compared with 41 percent of all students—a 20 percentage point difference.

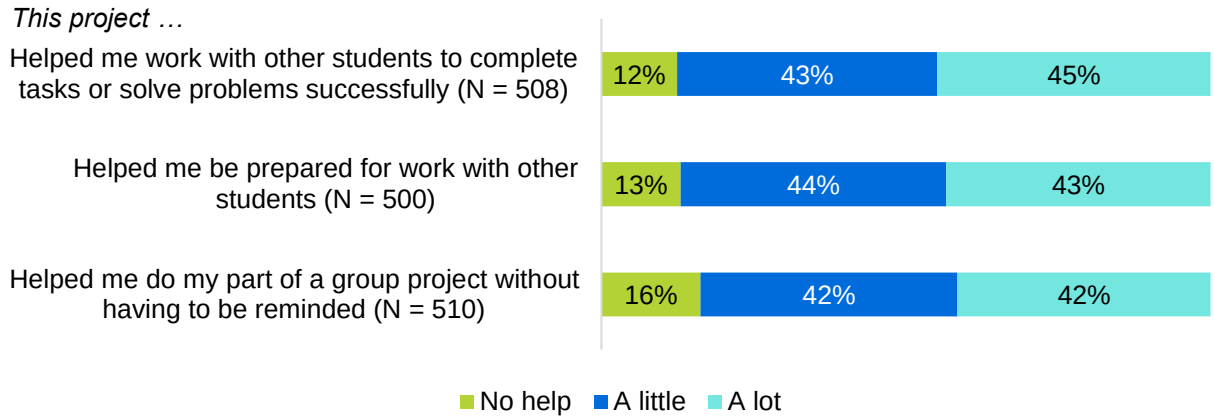
Figure 15. Percentage of MSD students indicating greater communication skills via projects, Year 1



Source: Education Northwest analysis of student survey data.

Overall, 94 percent of students said the project helped them with collaboration. Overall, only 6 percent of students said the project did not help them in any of the three areas related to collaboration on the survey (figure 16). Compared with other grade bands, the percentage of middle school students who said the project helped them "a lot" regarding collaboration was typically 7 to 12 percentage points lower. In contrast, the percentage of English learner students who said the project helped them with collaboration was higher for all three areas, with 67 percent saying the project helped them a lot with both "[being] prepared for work with other students" and "[working] with other students to complete tasks or solve problems successfully." Further, 72 percent of English learner students said the project helped them a lot to "do [their] part of a group project without having to be reminded" compared with 42 percent of all students.

Figure 16. Percentage of MSD students indicating greater collaboration skills through projects, Year 1



Source: Education Northwest analysis of student survey data.

In open-ended survey comments, students most frequently described increased collaboration skills and engagement in learning as an outcome of project work. To a slightly lesser degree, students commented on increased communication skills and mastery of core content. Few students wrote about their growth in critical thinking. This mostly aligns with the deeper learning outcomes MSD educators discussed in focus groups, as they also identified overall student engagement as the primary outcome, followed by communication and collaboration.

> *The most important thing I learned in this project is that working with a group is better than working alone.* (MSD student)
>
> *[The project] gave us students a chance to do more than essays and written book reports; we did so much more, which was fun and made us want to do more and learn more.* (MSD student)
>
> *The most important thing I learned about this project was to manage time in a good manner, learn to take criticism from other peers, and learn how to present out to a class without having to be embarrassed.* (MSD student)
>
> *I got to do self-planning. I also had to make it with all facts and cite my facts. The project helped me understand what I was learning.* (MSD student)

System Conditions and Diffusion of PBL

System Conditions

Although MSD schools are making progress in building the culture for PBL, challenges persist in terms of time and capacity. Based on teacher survey responses, the top three enabling conditions in place for PBL during Year 1 were school-level administration support (75 percent), colleagues who are willing to collaborate and share ideas (63 percent), and district-level administration support (58 percent). Further, teacher ratings of all culture-building conditions increased since baseline**.**

On the survey, we received open-ended responses from 210 MSD teachers about what they perceived to be the most useful supports their school provided for PBL in Year 1, and we received another 112 responses in the "additional comments" section at the end of the survey. Regarding useful supports, teachers most frequently identified time for collaboration and planning (41 responses), peer sharing (30 responses), training (28 responses), and administrator support (27 responses). Fewer than 12 responses focused on coaching, resources, or tools as resources they received.

Challenges remain in building the culture for PBL; the areas where teachers gave the lowest ratings of system conditions for PBL were adequate time for collaboration (24 percent) and adequate time for planning (26 percent). Although teachers provided higher ratings for PBL compared with general teaching for each of the capacity-building conditions, the third-biggest challenge was in receiving ongoing coaching and feedback (29 percent). Teachers most

commonly wrote about challenges associated with implementing PBL in the classroom (13 responses), a need for more school/district supports (12 responses), and a desire for more PBL training (12 responses).

Below, we unpack the survey results for culture and capacity building in more detail.

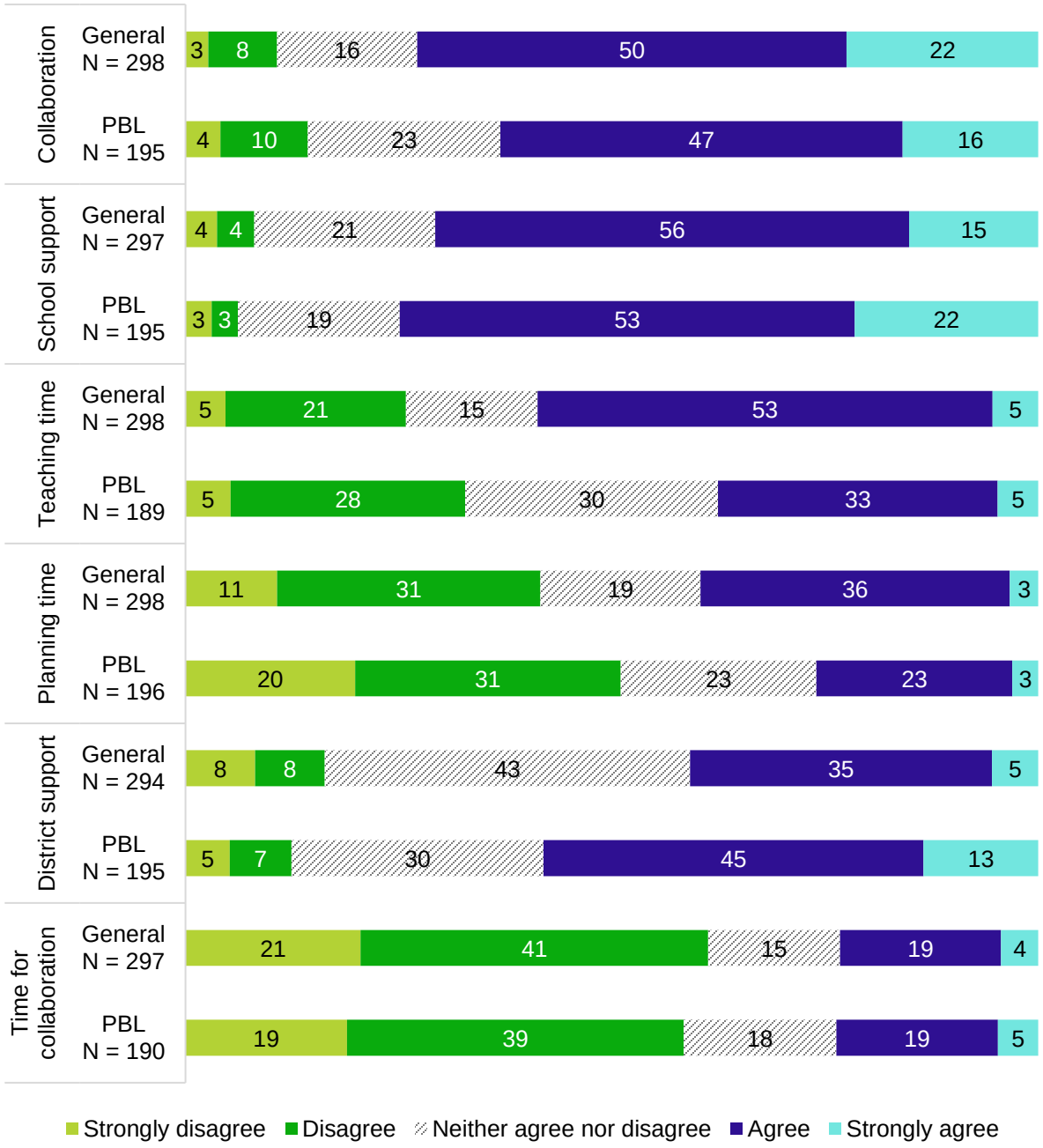
In terms of school culture, 72 percent of teachers agreed that their colleagues were willing to collaborate, but only 23 percent agreed that they had adequate time for collaboration. Similarly, 63 percent of respondents agreed that their colleagues were willing to collaborate regarding PBL, but only 24 percent agreed that they had adequate designated time to do so (figure 24).

> *[The most useful support for PBL was] hearing feedback from other teachers during our PLCs about their PBL projects. However, the only time we get to see or hear about them are during our faculty meeting once a month.* (MSD teacher survey respondent)

Teachers commonly said they felt supported by their school administrators to try new practices both generally and for PBL. Overall, 71 percent of respondents agreed or strongly agreed that their school administration supports teachers in trying new practices in general, and 75 percent agreed or strongly agreed that their school administration supports teachers in trying new practices related to PBL. Teachers reported higher levels of support from the district for trying new practices related to PBL (58 percent) than for trying new practices in general (40 percent) (figure 17).

> *Although we are just beginning our journey to PBL within our school, our principal is very supportive in allowing us the opportunity to learn more about PBL and has been very helpful in allowing us to bring this initiative opportunity to the rest of the staff. Our PBL team works very well in brainstorming ideas and ways to present PBL as a strong and successful instructional practice.* (MSD teacher survey respondent)

*Figure 17. MSD teacher ratings of school-level system conditions related to **culture**, Year 1*



Note: Some percentages may not add up to 100 due to rounding.

Source: Education Northwest analysis of teacher survey data.

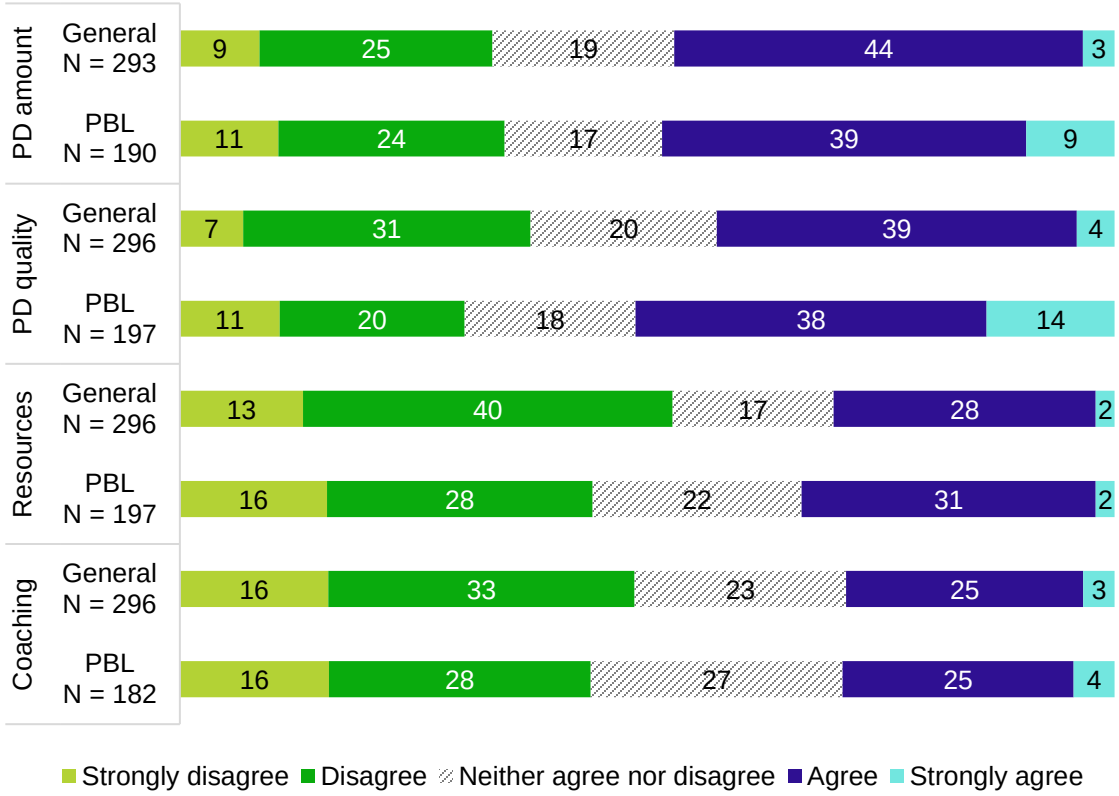
Fewer than half of teachers (47 percent) agreed that they received adequate professional development. Overall, 47 percent of teachers agreed or strongly agreed that they received an adequate amount of professional development generally, and 48 percent agreed or strongly agreed that they received an adequate amount of professional development related to teaching PBL (figure 18).

Time to collaborate had been helpful, but more professional development in PBL would be more useful to me at this time. (MSD teacher survey respondent)

We've been asked to do PBL with almost zero training (just info at a staff meeting) and NO formal training. I wouldn't ask students to do something without teaching them first; why are we asking teachers to do something with no/minimal training? It isn't following "best practice." (MSD teacher survey respondent)

Teachers typically did not believe they had access to quality resources or coaching, generally or specific to PBL. Less than a third of teachers agreed or strongly agreed that they had access to quality instructional resources or curricula, generally (30 percent) or for PBL (33 percent). Similarly, most teachers did not believe they received ongoing coaching and feedback generally or specific to PBL, with just 28 percent and 29 percent, respectively, agreeing or strongly agreeing (see figure 18).

*Figure 18. MSD teacher ratings of school-level system conditions related to **capacity building**, Year 1*



Note: Some percentages may not add up to 100 due to rounding.

Source: Education Northwest analysis of teacher survey data.

> *I love PBL, but I feel like there isn't enough peer feedback for teachers who attempt it to be sure they are doing it in a meaningful way. There seems to be a lot of nodding and people patting each other on the back rather than addressing weaknesses in PBL designs in such a way that they could be improved in the future.* (MSD teacher survey respondent)

MSD focus group participants echoed many of these challenges, especially issues of time and the need for increased support for quality implementation of PBL. In addition, they cited challenges related to the district's current context, such as the lack of a teacher contract and substitute teachers to cover teachers who need time away from the classroom to participate in training or provide coaching to colleagues. MSD educators also discussed issues of trust and leadership turnover as barriers to getting teachers to try innovative practices, such as PBL.

> *I was provided with a coach; they didn't have the time in their day to do anything with me. There was no time allotted for them to come work with me on anything.* (MSD focus group participant)

> *… [T]hat's the culture in my building. [PBL is] just another thing that's going to go away, so why bother putting all this effort into something that's going to go away? Some people really understand that this is a way of teaching. This is just a strategy and approach. It's good teaching. Some people are not there yet.* (MSD focus group participant)

Role of Networks in Diffusion of PBL

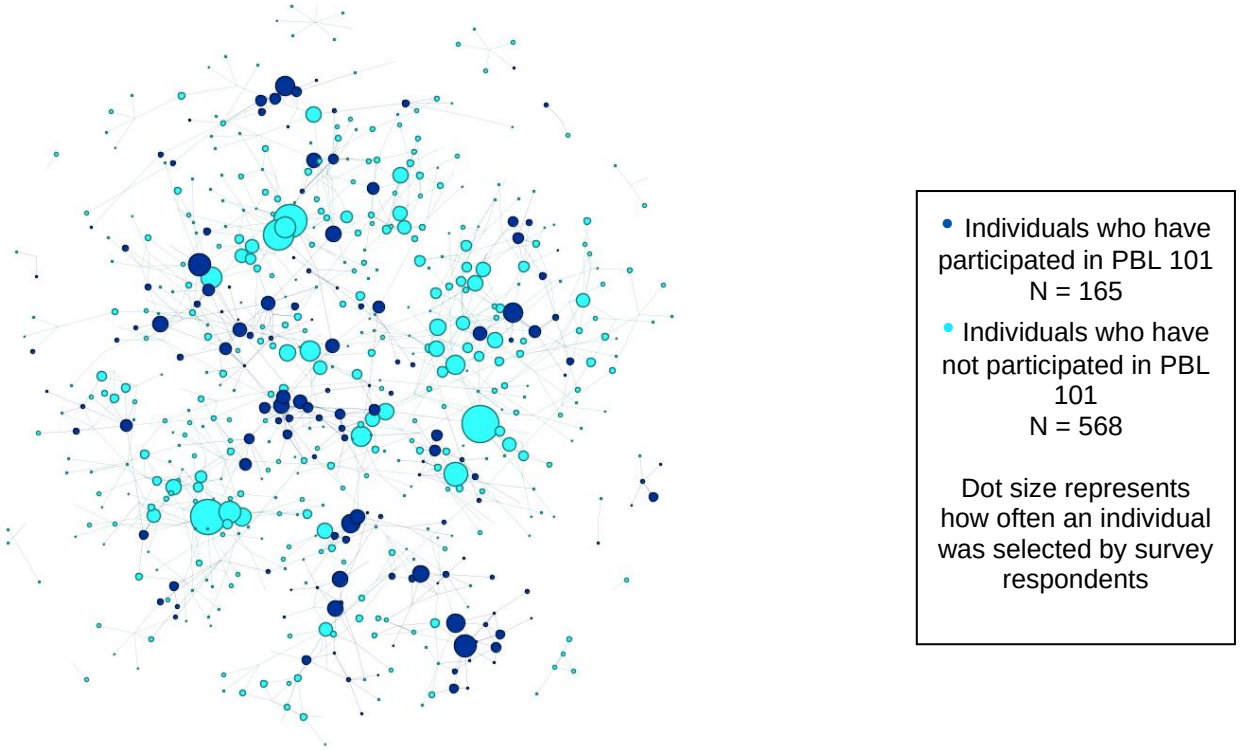
To understand the exchange of information occurring in the MSD school system network, teachers were asked to identify whom they go to for advice. We did this by asking teachers in both the baseline (2017-18) and Year 1 (2018–19) teacher surveys, "Who did you go to most often for advice or with general questions related to content knowledge, your instructional practice, or navigating school systems (i.e., figuring out school management or bureaucracy)?" Teachers were also asked at baseline and during Year 1 about the number of projects they did, the number of projects over eight hours, and the quality of their projects.

MSD teachers who were school leadership team members were identified by other teachers as opinion leaders on the survey at a greater rate than those who were not school leadership team members. These leadership team member teachers (n = 59) had between seven and eight survey respondents (mean in-degree centrality of 7.6) identify them as a person they sought out for advice or answers to general questions related to content knowledge, instructional practice, or navigating school systems, whereas those who were not leadership team members (n = 674) had about four people identify them as a person they sought out for advice (mean in-degree centrality of 4.1).

MSD teachers who participated in PBL 101 were identified by other teachers in the survey as the people they go to for advice about general questions at a greater rate than those who did not participate. These opinion leaders identified through the survey were sought out for advice or answers to questions regarding content knowledge, instructional practice, or navigating school systems more often (mean in-degree centrality of 5.4) than those who did not take PBL 101 (mean in-degree centrality of 3.6). In figure 19, dark blue dots represent individuals who

participated in PBL 101 in Cohort 1, and light blue dots represent individuals who did not. Although many individuals who did not participate in PBL 101 during Cohort 1 were also chosen by survey respondents as people to whom they go for advice or with questions (large light blue dots), PBL 101 Cohort 1 participants (dark blue dots) make up a larger proportion of large dots on the map than the 23 percent of the MSD network they represent.

Figure 19. MSD teachers who participated in PBL 101 in Cohort 1 were more often chosen by survey respondents as people to whom they go for advice or with questions



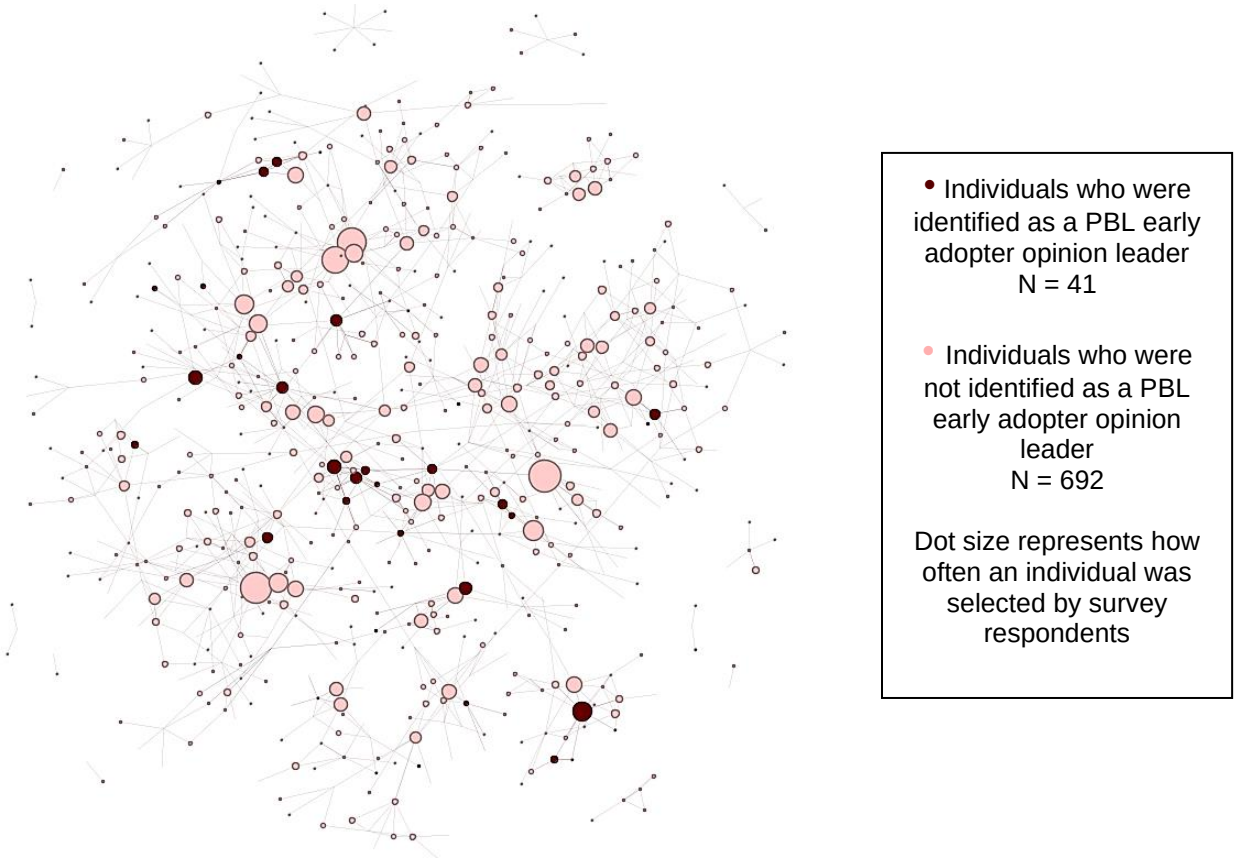
Source: Education Northwest analysis of teacher survey data.

Teachers identified as PBL early adopter opinion leaders by school leadership at baseline were significantly more likely to be identified as opinion leaders by teachers in the survey, and they were more likely than other teachers to teach projects. Teachers who were identified by school leadership as both influential and early adopters of PBL were chosen by teacher survey respondents significantly more often than others. These teachers were also more likely than others to teach a project at baseline (63 percent versus 50 percent) and significantly more likely to do so in Year 1 (69 percent versus 45 percent), as well as to teach a higher-quality project in Year 1 (overall quality score of 5.2 versus 4.7).

Figure 20 represents the network for MSD survey respondents, where the size of the dot indicates how often an individual was chosen in the survey. Dark red dots represent individuals who were identified as PBL early adopter opinion leaders, and the light red dots represent individuals who were not identified as PBL early adopter opinion leaders. As seen in

figure 20, many individuals who are not PBL early adopter opinion leaders were chosen by survey respondents as people to whom they go for advice or with questions (large light red dots). However, PBL early adopter opinion leaders (dark red dots) appear prominently on the network map, given that PBL early adopter opinion leaders comprise only 6 percent of the overall network.

Figure 20. MSD survey respondents more often chose PBL early adopter opinion leaders as people to whom they go for advice or with questions



Source: Education Northwest analysis of teacher survey data.

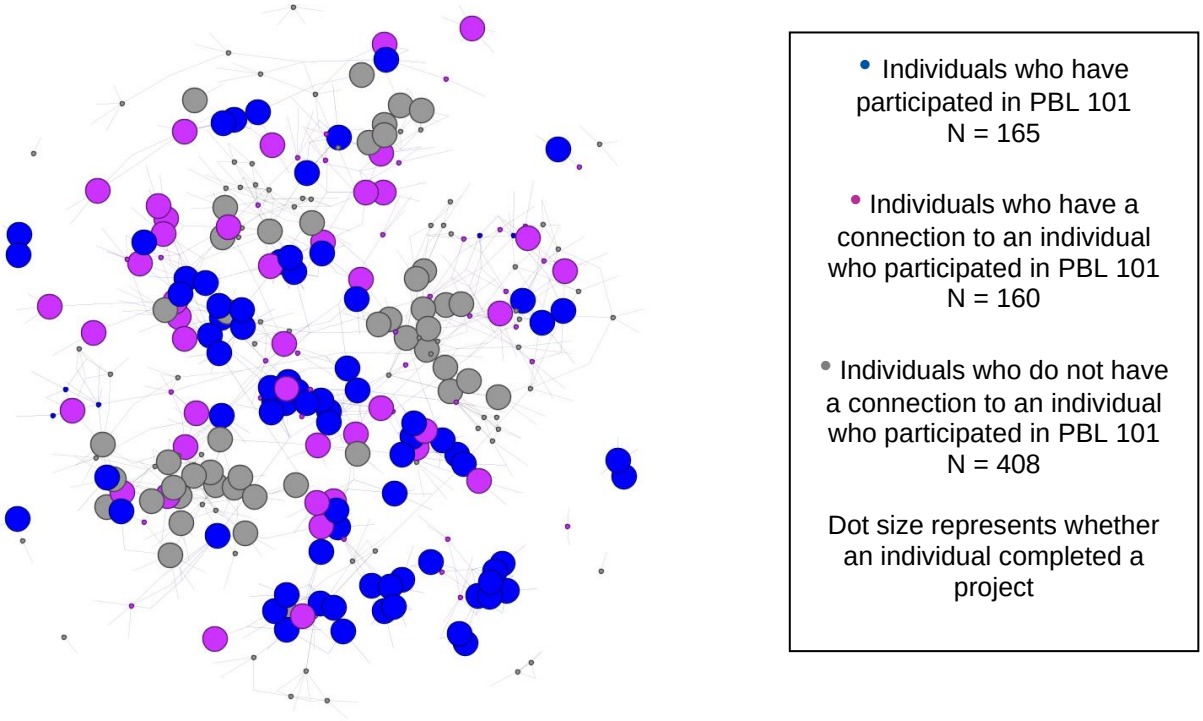
To understand diffusion of information from individuals taking PBL 101 to others in their schools and school systems, we also analyzed the tie between PBL 101 participants and other teachers. For teachers who did not take PBL 101, we looked at whether the teacher either went to a PBL 101 teacher for advice or were identified by a PBL 101 teacher as an individual to whom they go for advice. These teachers are said to have a tie to a PBL 101 teacher in the analysis below.

In Cohort 1 schools, teachers who were tied to another teacher in the social network who participated in PBL 101 were significantly more likely to have done a project in Year 1 than teachers who were not. SNA indicates that 54 percent of these connected teachers (n = 70)

facilitated a project in Year 1 compared with 33 percent of teachers (n = 21) who were not connected to a PBL 101 participant.

Figure 21 is a map of individuals by their connection to a PBL 101 participant, sized by whether they completed a project. Note that blue dots, or individuals who have participated in PBL 101, are mostly large dots (94 percent did a project). However, although purple dots—or individuals who are connected to PBL 101 participants—are more often large dots (53 percent did a project) than gray dots—or individuals who are not connected to a PBL 101 participant (39 percent did a project)—this difference is not statistically significant.

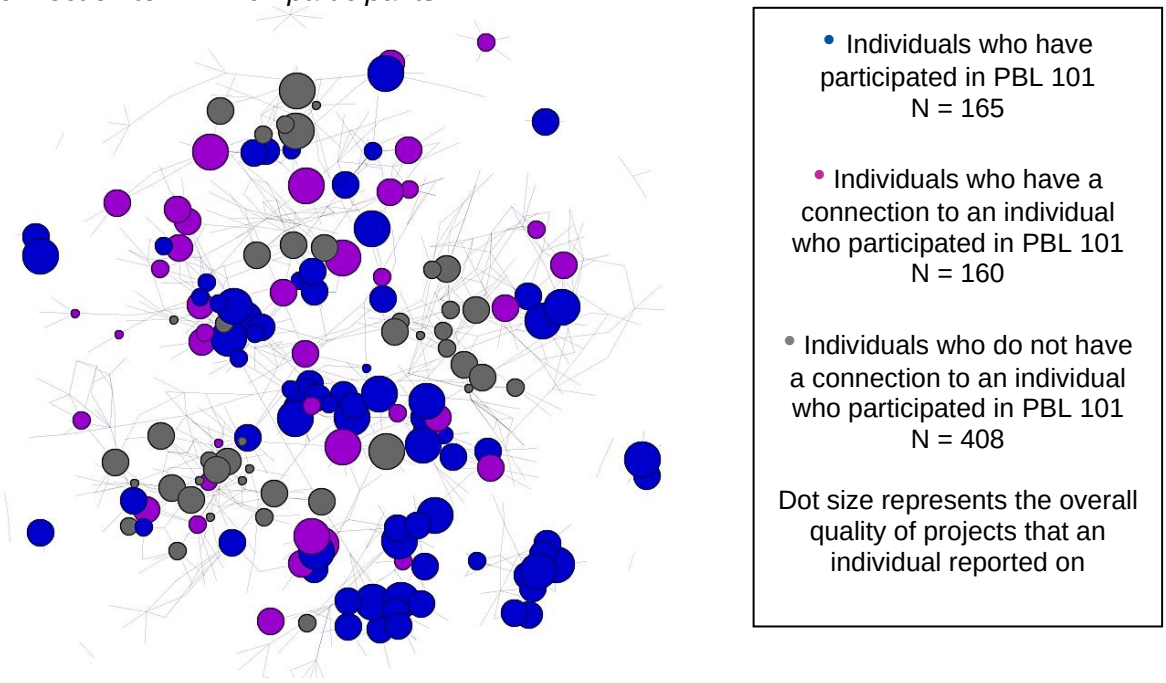
Figure 21. MSD Year 1 project facilitation by connection to PBL 101 participants



Source: Education Northwest analysis of teacher survey data.

Overall, MSD teachers who were tied to another teacher in the social network who participated in PBL 101 were not significantly different in their project quality, as reported in the teacher survey. Figure 22 is a map of individuals by their connection to a PBL 101 participant, sized by the quality of the project they reported on. Note that blue dots—or individuals who have participated in PBL 101—are mostly large dots (average overall project quality score = 5.08). However, although purple dots—or individuals who are connected to a PBL 101 participant—have a higher average project quality score (4.63) than gray dots—or individuals who are not connected to a PBL 101 participant (4.2)—this difference is not statistically significant.

Figure 22. MSD Year 1 overall project quality score from the teacher survey measured by connection to PBL 101 participants



Source: Education Northwest analysis of teacher survey data.

Chapter 3. Pearl City-Waipahu Complex Area Results: 2018–19

In this chapter, we present results for each research question specifically for PCW. We start with results related to research question 1: *To what extent do students, including students furthest from opportunity, experience two high-quality projects each year?* We present data regarding project facilitation; project quality; and deeper learning from the teacher survey, class rosters, educator focus groups, and project plans. Next, we examine research question 2: *How does quality PBL scale and spread within and across schools?* We draw on the teacher survey and educator focus groups to report on findings related to system conditions and teacher networks and how they may relate to the diffusion of quality PBL.

This chapter draws on results from the teacher survey (284 PCW teachers responded), the matching of class rosters with teacher survey respondents (rosters were matched for 7,518 PCW students), analysis of 10 project plans from PCW teachers, and educator focus groups (32 PCW teachers and administrators participated). See the technical appendix for more details on these samples.

Project Facilitation and Quality

Project Facilitation

In this section, we discuss the number of projects teacher survey respondents reported facilitating in spring 2019. Next, we discuss the percentage of students who experienced these projects based on matching class rosters with teacher survey results.

Number of Projects Facilitated by Teachers

Overall, 53 percent of teachers reported teaching a project in Year 1, with rates significantly higher for Cohort 1 schools and PBL 101 participants compared with Cohort 2 schools and non-participants. Among Cohort 1 schools, 67 percent of respondents reported teaching a project compared with 37 percent of respondents in Cohort 2 schools. In addition, 93 percent of respondents who were PBL 101 participants taught a project compared with 33 percent of respondents who did not participate in PBL 101.

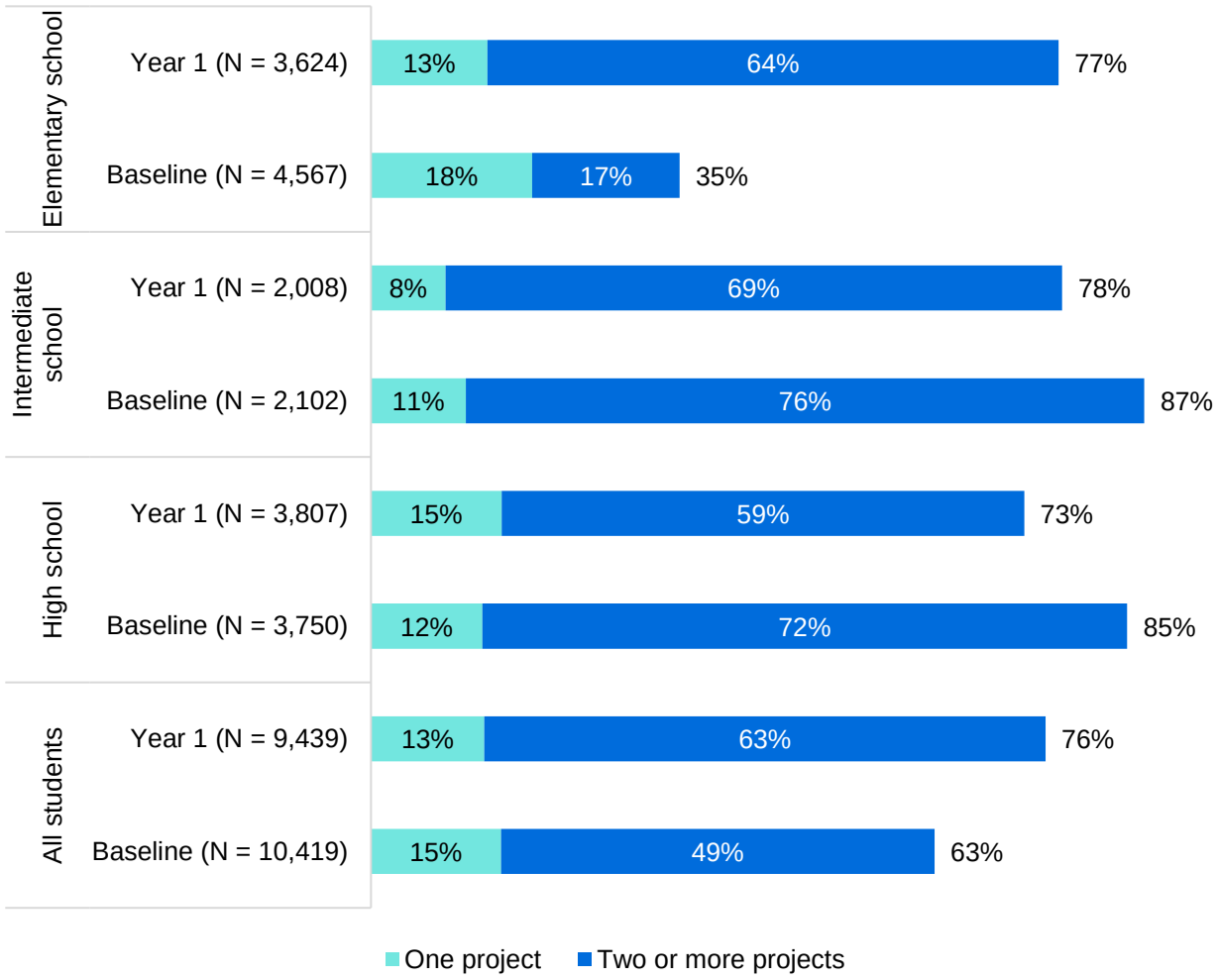
In total, 51 percent of teachers reported an increase in the number of projects taught from baseline to Year 1, with 27 percent who did not teach a project at baseline teaching a project

during Year 1. There were no statistically significant differences in the change in the number of projects taught from baseline to Year 1 by any school- or teacher-level characteristics.

Number of Projects Experienced by Students

Overall, 76 percent of matched students experienced at least one project, an increase of 13 percentage points from baseline.[22] The overall percentage of students participating in two or more projects increased to 63 percent, a 14-percentage point increase (figure 23). Participation rates were similar by grade band, with the highest rates for intermediate students. The largest increase in participation since baseline were for elementary school students (48 percentage points).

*Figure 23. Percentage PCW **students** who experienced projects lasting eight hours or more overall and by grade band, Year 1 and baseline*



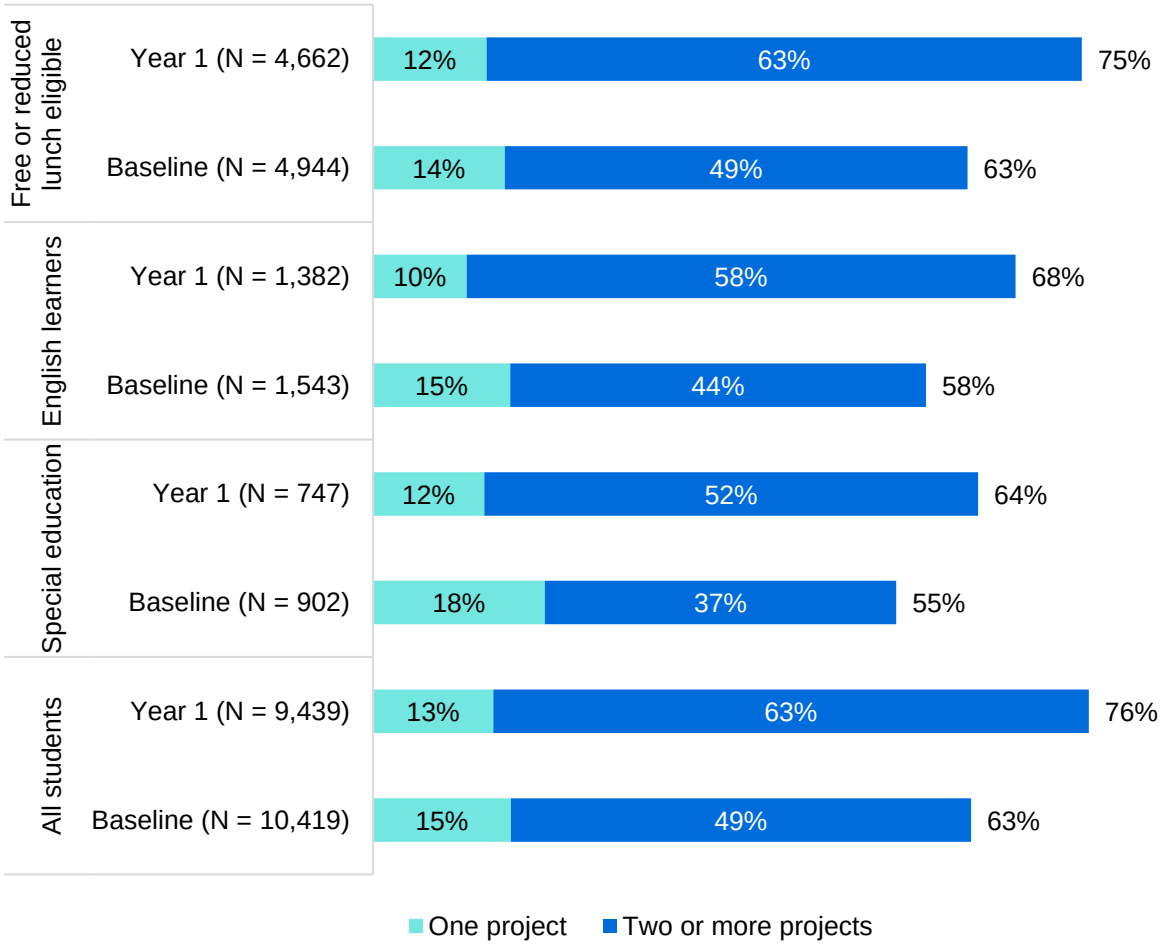
Note: Some percentages may not add up to the listed total due to rounding.

Source: Education Northwest analysis of teacher survey data matched to student roster data.

[22] Percentages are based on the number of students who could be matched to a teacher survey response.

A smaller percentage of English learner students and students receiving special education services experienced projects that lasted at least eight hours. Participation in two or more eight-hour projects for students receiving special education services was 11 percentage points lower than for students overall, and the rate for English learner students was 5 percentage points lower (figure 24). However, their participation rates increased at a similar or slightly faster rate (15 percentage points for students receiving special education services) than the overall population. The project experience rate for students eligible for free or reduced-price lunch was essentially the same as the rate for the overall population.

Figure 24. Percentage of PCW students who experienced eight-hour projects by eligibility for free or reduced-price lunch, special education services, or English learner services, Year 1 and baseline

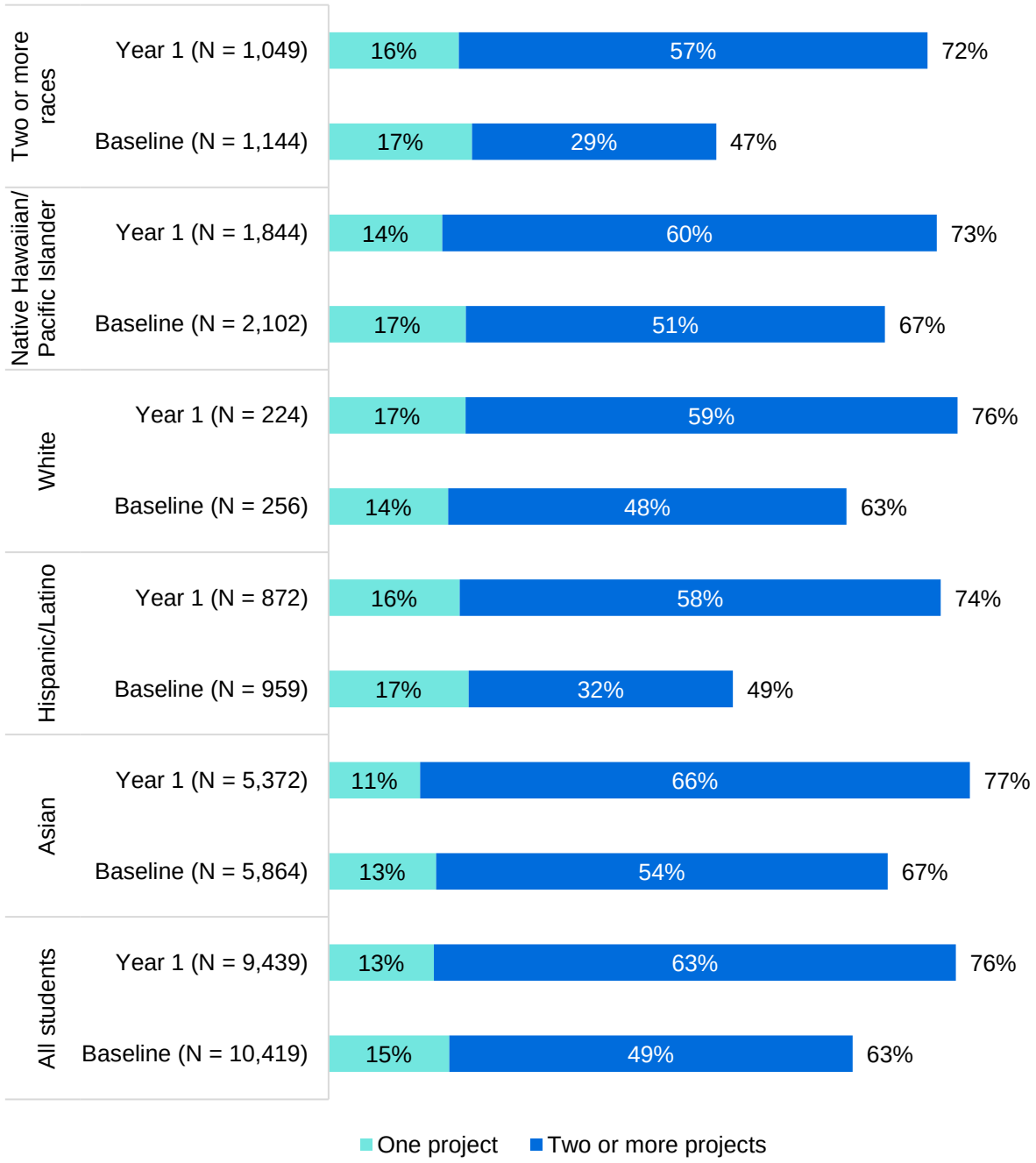


Note: Some percentages may not add to total due to rounding

Source: Education Northwest analysis of teacher survey data matched to student roster data

Disparities among racial/ethnic groups in opportunities to experience two eight-hour projects were much lower in Year 1 than at baseline. Students who identified as Hispanic/Latino or two or more races saw increases of 26 percentage points and 27 percentage points, respectively (figure 25).

Figure 25. Percentage of PCW students who experienced eight-hour projects by race/ethnicity, Year 1 and baseline



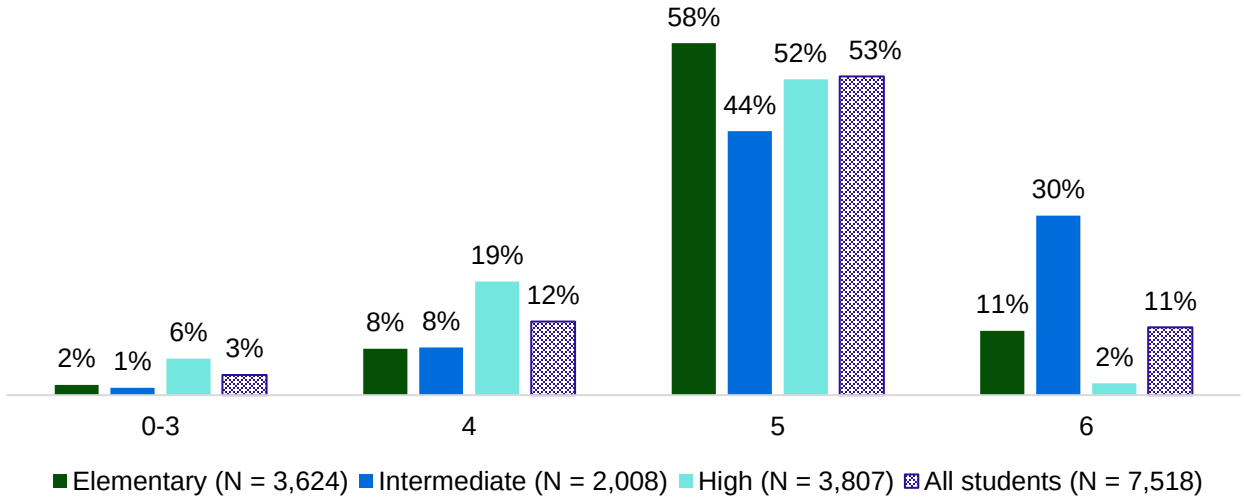
Note: Some percentages may not add up to the listed total due to rounding.

Source: Education Northwest analysis of teacher survey data matched to student roster data.

Overall, 76 percent of students experienced projects with at least four of the six Gold Standard Design Elements measured, and 63 percent experienced projects with five to six elements. Teacher survey data on project quality were matched to the student rosters. In total,

80 percent of matched students (7,518) had data reported on project quality by their teacher. Figure 26 shows the percentage of students with a teacher who reported facilitating a project with zero to six Gold Standard Design Elements. We did not receive teacher reports of project quality for 20 percent of matched students. The matched projects had an average quality rating of 4.9 on a scale of 0 to 6, meaning the project met the threshold for five or more of the Gold Standard Design Elements (figure 26).

Figure 26. Percentage of PCW students who experienced zero to six Gold Standard Design Elements by grade band based on teacher reports, Year 1



Note: Some percentages do not add up to 100 because students with no project quality data were not included.

Source: Education Northwest analysis of teacher survey data matched to student roster data.

A higher percentage of intermediate school students and elementary school students than high school students experienced projects that included five to six of the Gold Standard Design Elements measured. Overall, 74 percent of intermediate school students experienced a project rated by teachers as a 5 or 6 compared with 69 percent of elementary school students and 54 percent of high school students. In addition, only 2 percent of high school students experienced a project with all six of the Gold Standard Design Elements measured compared with 11 percent of elementary school students and 30 percent of intermediate school students (see figure 26).

The percentage of students in the total population who experienced projects that teachers reported as having five or six of the Gold Standard Design Elements measured was the same as the corresponding percentage of students eligible for free or reduced-price lunch. A lower percentage of English learner students and students receiving special education services experienced projects with five or six of the Gold Standard Design Elements measured—57 percent of English learner students and 48 percent of students receiving special education services compared with 64 percent of all students. When looking at the average overall quality

score for students, the differences among English learner students, students receiving special education services, and students eligible for free or reduced-price lunch were small. On average, the difference was less than 0.1 on a scale of 0 to 6 for English learner students and students eligible for free or reduced-price lunch. For students receiving special education services, the difference was 0.25.

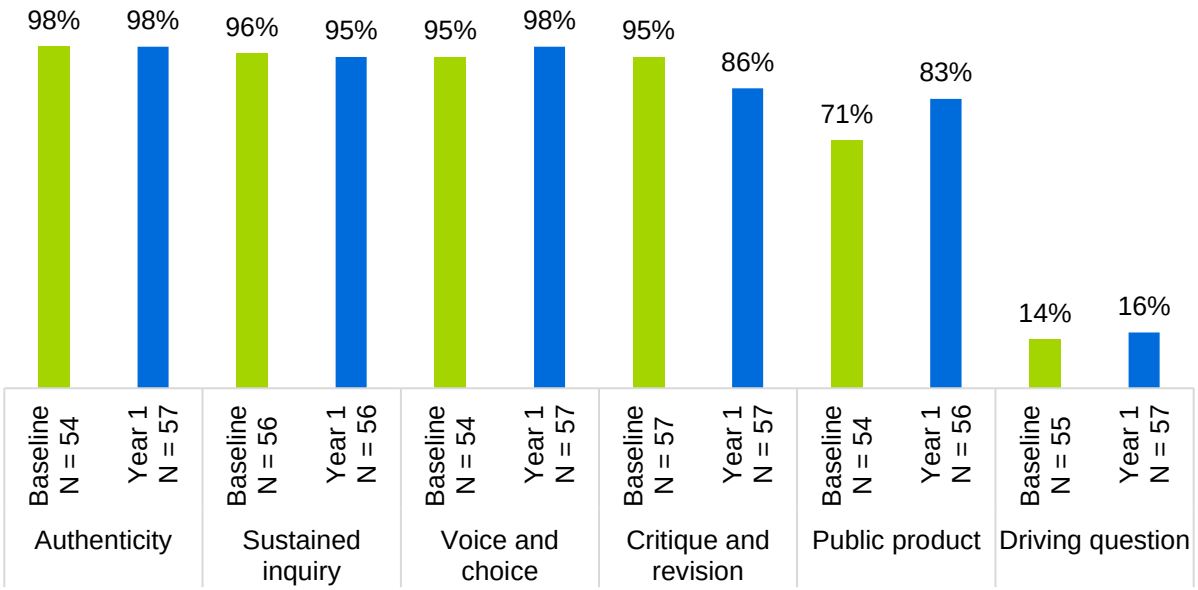
Quality of Projects

In Year 1, we received project quality data from 139 PCW teachers, 57 of whom completed both the baseline and Year 1 survey

Teacher-Reported Use of Gold Standard Design Elements[23]

In Year 1, 72 percent of teachers said their spring 2019 projects met the quality threshold for five or more of the six Gold Standard Design Elements measured, with few projects meeting the threshold for *driving question*. There was a significant difference for overall project quality between elementary school teachers and high school teachers. There were no significant differences by any other school or teacher characteristics in meeting the minimum quality threshold.

Figure 27. Percentage of teachers in PCW with projects meeting the quality threshold for each Gold Standard Design Elements based on teacher reports, baseline and Year 1

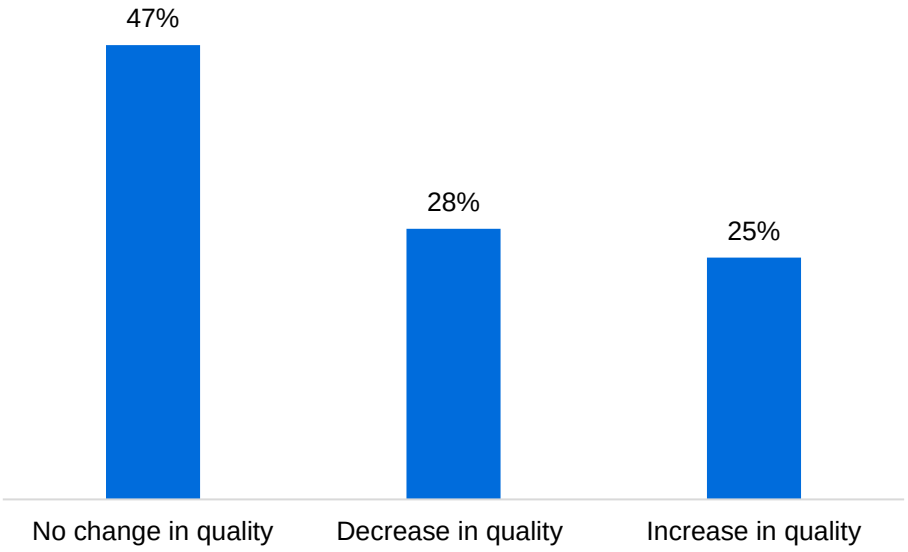


Source: Education Northwest analysis of teacher survey data.

[23] As discussed in the introduction, the teacher survey measured six of the eight Gold Standard Design Elements. The survey did not measure reflection or student learning goals.

Although the overall quality score did not change significantly since baseline, the largest increases in quality were for *public product*. Specifically, the average baseline quality was 4.6 (ranging from 1 to 6), and average Year 1 quality was also 4.6 (ranging from 0 to 6), meaning that teachers reported their projects met the threshold for four to five Gold Standard Design Elements. Teachers who participated in PBL 101 during Cohort 1 increased their project quality since baseline significantly more than those who did not participate (figures 27 and 28).

Figure 28. Percentage of change in project quality from baseline to Year 1, as reported by teachers in PCW (N = 57)



Source: Education Northwest analysis of teacher survey data.

Evidence of Gold Standard Design Elements in Project Plans

All PCW project plans involved *sustained inquiry* regarding a *challenging problem or question* and met the threshold for *student learning goals* and *public product*. Compared with overall trends in PCW teacher reports of project quality on the teacher survey, these plans had higher levels of quality in each of these elements, especially *driving question*. All 10 PCW plans explicitly stated at least one success skill—mainly critical thinking (eight) and collaboration (five). Slightly fewer plans (eight) met the threshold for *authenticity* or *critique and revision*. All the PCW plans analyzed used the PBLWorks Project Planner template.

In an example of a grade 1 project plan aligned with Next Generation Science Standards and focused on critical thinking, the driving question was: *How can we design a clothing article that protects us from rain or sun by using an idea from a plant part?* This project allowed students to use real-world processes to gather resources and test data, as students were challenged to grow, research, and test plants for use in designing a protective item of clothing. They also heard from community speakers, such as a grandparent who came in to teach photosynthesis. Students created a physical model, drawing, or sketch to illustrate their plant-based design. Students

then presented their results in a slideshow with various audiences, including families, other classes, and community members.

Table 3. Percentage and number of analyzed plans across PCW that met the quality threshold for each of the eight Gold Standard Design Elements (n = 10)

Gold Standard Design Element	Percentage of plans that met the threshold
Challenging problem or question	100% (10)
Student learning goals	100% (10)
Public product	100% (10)
Sustained inquiry	100% (10)
Reflection	100% (10)
Critique and revision	80% (8)
Authenticity	80% (8)
Student voice and choice	100% (10)

System Conditions and Diffusion of PBL

System Conditions

Overall, PCW teacher ratings for all culture and capacity-building system conditions increased from baseline to Year 1. This suggests that schools across the complex area may be improving the system conditions for PBL. Based on survey responses, the top three enabling conditions for PBL that were present in schools during Year 1 were having colleagues who are willing to collaborate and share ideas (62 percent), having a school administration that supports teachers in trying new practices (62 percent), and access to quality professional development (58 percent).

In open-ended survey responses, teachers most frequently identified training (80 responses), time for collaboration and planning (34 responses), and coaching (24 responses) as the most useful support they received in Year 1. To a lesser degree, teachers identified resources (19 responses), peer sharing (16 responses), and administrator support (6 response).[24]

Challenges persist for both building the culture and capacity; the areas where teachers gave the lowest ratings of system conditions for PBL on the survey were receiving ongoing coaching and

[24] On the survey, we also received 204 open-ended responses from PCW teachers about what they perceived to be the "most useful supports" their school provided for PBL in Year 1 and another 112 responses in the "additional comments" section.

feedback (30 percent), having an adequate amount of planning time (32 percent), and having an adequate amount of teaching time (34 percent). In their open-ended comments in the survey, teachers most frequently described challenges associated with lack of planning time (12 responses), implementation of quality PBL practices in the classroom (11 responses), and lack of teaching time (10 responses).

Below, we unpack the survey responses related to culture and capacity building in more detail.

For school culture, teachers identified a need for more time to plan and teach PBL. Overall, 69 percent of respondents agreed or strongly agreed that they had adequate teaching time in general, but only 34 percent agreed or strongly agreed that they had adequate teaching time for PBL. Similarly, 60 percent of respondents agreed or strongly agreed that they had an adequate amount of planning time generally, but only 32 percent agreed or strongly agreed that they had an adequate amount of planning time for PBL (figure 26).

> *It has been extremely challenging to find the time to implement PBL within the already packed daily schedule, especially with the many other "must dos" required by our school.* (PCW teacher survey respondent)

Teachers also identified a need for more designated time for collaboration regarding PBL. Overall, 83 percent of respondents agreed or strongly agreed that they generally have colleagues who are willing to collaborate and share ideas, and 62 percent of respondents agreed or strongly agreed that they have colleagues who are willing to collaborate regarding PBL. However, only 36 percent of respondents agreed or strongly agreed that they had an adequate amount of designated time to collaborate for teaching PBL with their colleagues (figure 30).

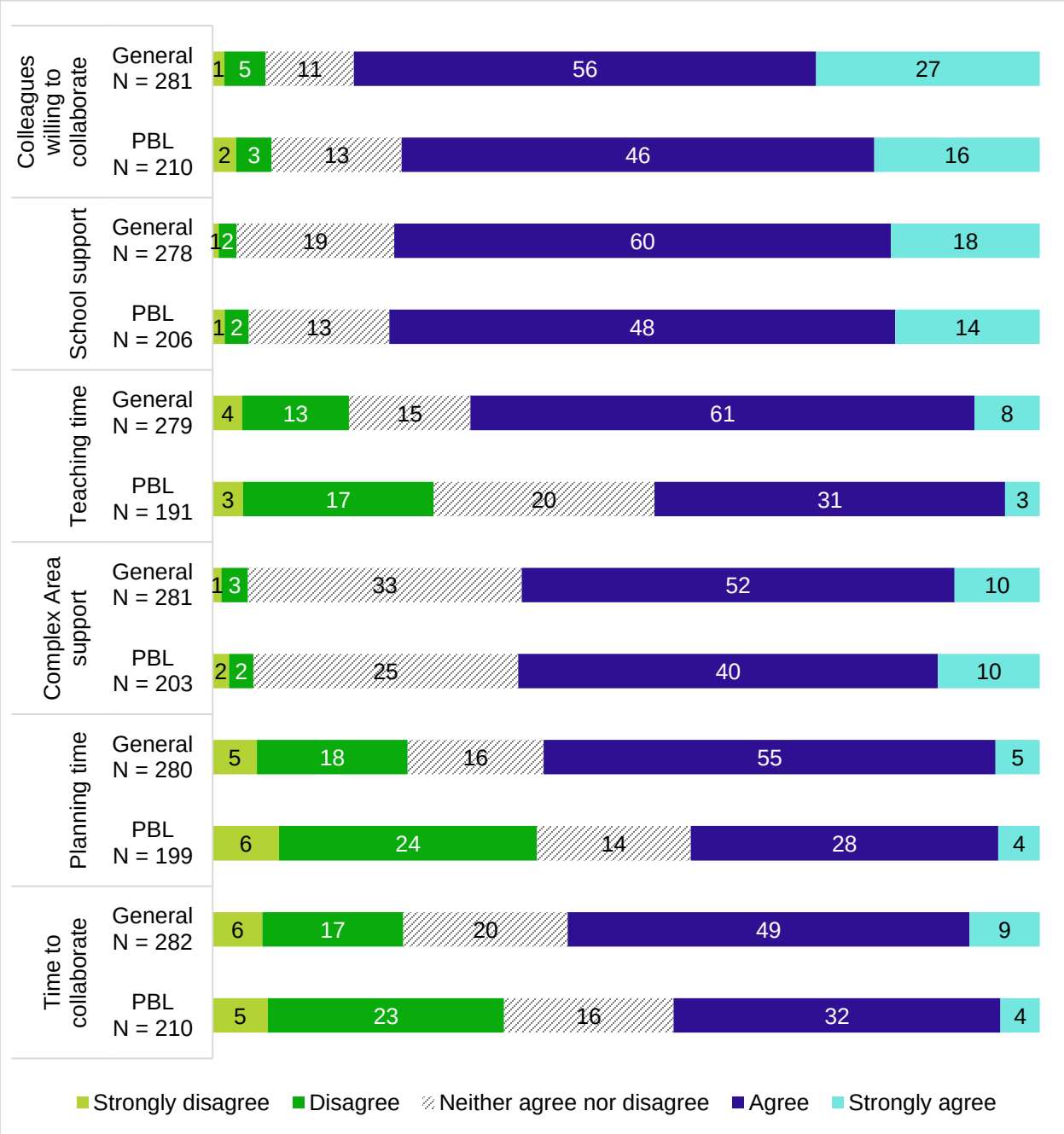
> *The most useful supports our school provided for PBL is to send groups of teachers to learn about PBL together—especially having at least two people on each grade level attend together to support each other.* (PCW teacher survey respondent)

> *Being given a new set of standards, a PBL, is a lot to handle in one year. Not given serious time to work with the department is a great hindrance. Science department needs DAYS to work, not an hour at a time at a staff meeting.* (PCW teacher survey respondent)

Teachers generally felt supported by school-level administration in trying new practices, although less so for PBL. Overall, 78 percent of teachers agreed or strongly agreed that they had support from school leadership for trying new practices in general, and 62 percent agreed or strongly agreed that they had support from school leaders for trying new practices related to PBL. Similarly, 62 percent of teachers agreed or strongly agreed that they had support from complex area leadership for trying new practices in general, and 50 percent agreed or strongly agreed that they had support from complex area leaders for trying new practices related to PBL (figure 29).

My principal provided us with materials when we asked, and she allowed us the freedom to try new ideas. She wanted to see us succeed and check[ed] up with us to see where we were along the way. But she also trusted our judgment and didn't force a specific project or idea on us. (PCW teacher survey respondent)

*Figure 29. PCW teacher reports of system conditions for **culture**, Year 1*



Note: Some percentages may not add up to 100 due to rounding.

Source: Education Northwest analysis of teacher survey data.

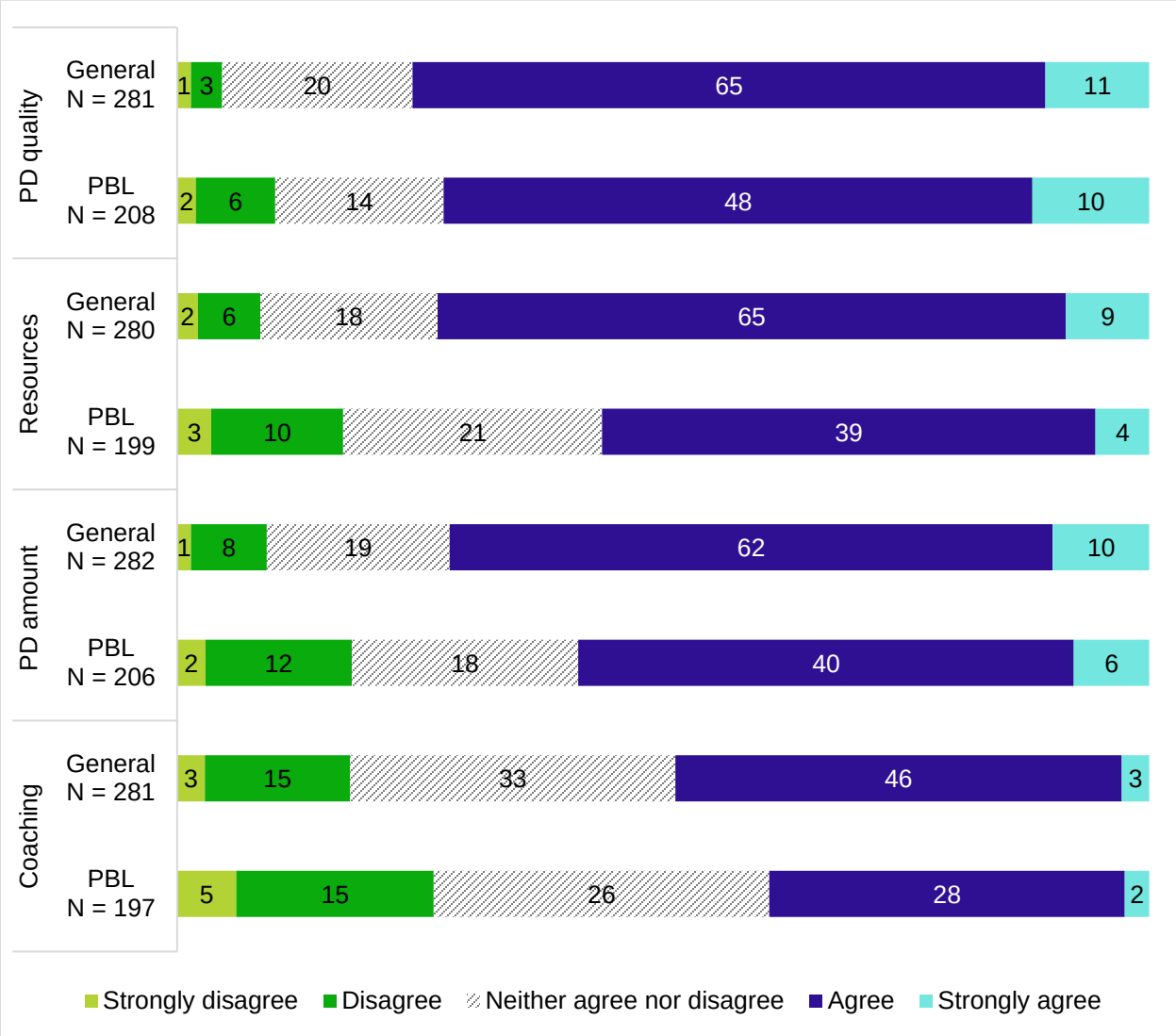
For capacity-building system conditions, teachers rated PBL professional development lower in terms of quality and amount. Although 76 percent of respondents agreed or strongly agreed that they received quality professional development in general, 58 percent agreed or strongly agreed that they received quality professional development specific to teaching PBL. Similarly, 72 percent of respondents agreed that they received an adequate amount of professional development generally, but only 46 percent agreed or strongly agreed that they received an adequate amount of professional development specific to PBL (figure 30).

> *It seemed that teachers' understanding of PBL and their development of the projects differed, depending on which training session they attended.* (PCW survey respondent)

On the whole, teachers did not believe they had access to quality resources or coaching specific to PBL. Overall, 43 percent of teachers agreed or strongly agreed that they had access to quality instructional resources or curricula for PBL compared with 74 percent in general. Similarly, less than third of teachers reported receiving adequate coaching for PBL compared with 49 percent in general (figure 30).

> *I think it is important to debrief with a coach to determine what is essential and not essential in PBL. Sometimes teachers can get sidetracked by small details that are not essential to the overall project.* (PCW survey respondent)

*Figure 30. PCW teacher reports of system conditions related to **capacity building**, Year 1*



Note: Some percentages may not add up to 100 due to rounding.

Source: Education Northwest analysis of teacher survey data.

These survey results align with key themes from the focus groups, where the most frequent challenges identified were related to culture and capacity building. PCW educators raised concerns about adopting PBL with quality, given that teachers are already "stretched thin" and PBL often takes more time than they planned. They said some teachers were having trouble "letting go" of conventional practices and cited the importance of having clear expectations from the new complex area leadership regarding implementation.

> *This year, we've seen over half our teachers start to see the value [of PBL] and knowing that, like, it's OK not to know and to let the students know it's OK not to know because through research or working with one another, we'll figure it out. You know, it's totally different versus "What was*

your score? What was your percent? Did you pass? Did you not pass?" (PCW focus group participant)

I think, though, one of the things that … would be extremely beneficial would be for some of the training to include more efficiency and practical aspects with day-to-day classroom ... like, how do you incorporate this without making it a quarter-long project? (PCW focus group participant)

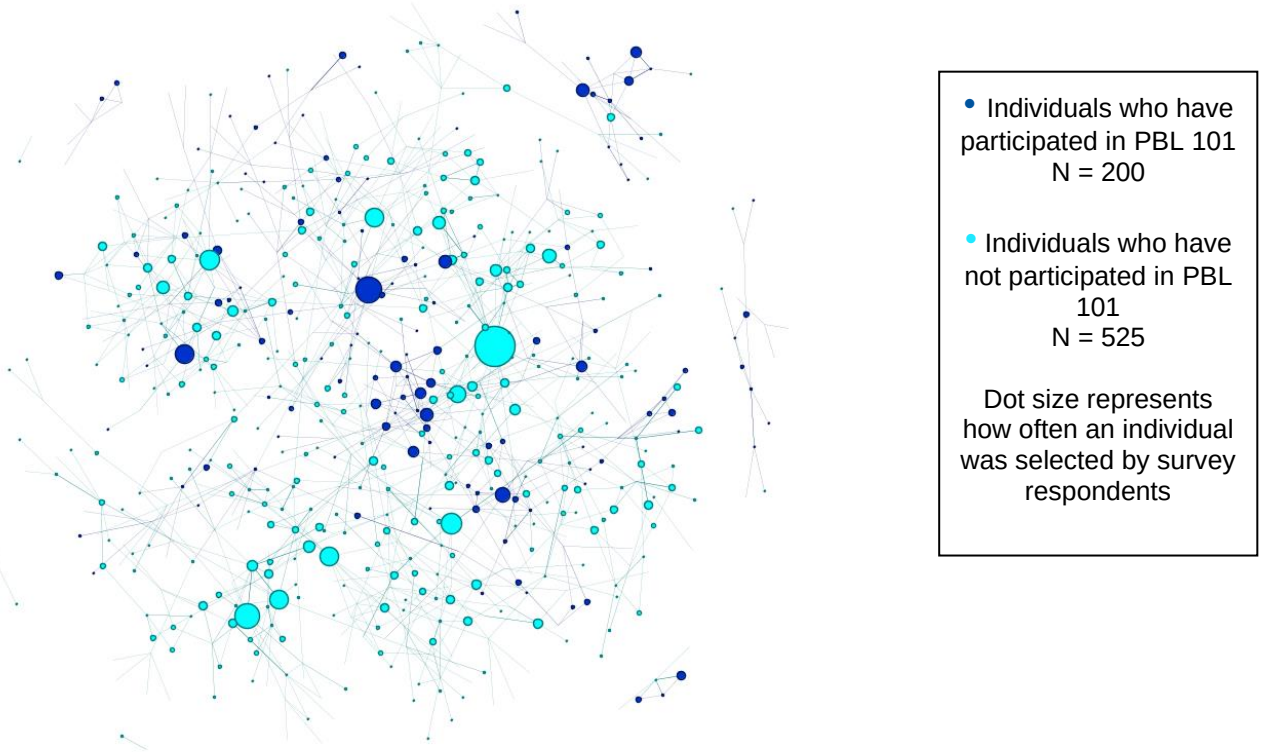
Role of Networks in Diffusion

To understand the exchange of information occurring in the PCW school system network, teachers were asked to identify whom they go to for advice. We did this by asking teachers in both the baseline (2017-18) and Year 1 (2018-19) teacher surveys, "Who did you go to most often for advice or with general questions related to content knowledge, your instructional practice, or navigating school systems (i.e., figuring out school management or bureaucracy)?" Teachers were also asked at baseline and during Year 1 about the number of projects they did, the number of projects over eight hours, and the quality of their projects.

PCW teachers who were school leadership team members were identified by other teachers as opinion leaders on the survey at around twice the rate of those who were not school leadership team members. These leadership team member teachers (n = 85) had about seven survey respondents (mean in-degree centrality = 7.3) identify them as a person they sought out for advice or answers to general questions related to content knowledge, instructional practice, or navigating school systems, whereas those who were not leadership team members (n = 640) were identified by between three and four people as a person they sought out for advice (mean in-degree centrality = 3.6).

PCW teachers who participated in PBL 101 were chosen by other survey respondents at similar rates as those who did not participate in PBL 101. This indicates these individuals are not identified through the survey as opinion leaders. In figure 31, dark blue dots represent individuals who participated in PBL 101 in Cohort 1, and light blue dots represent individuals who did not. PBL 101 Cohort 1 participants (dark blue dots) were chosen at about the same rate as individuals who did not participate in PBL 101 during Cohort 1 (large light blue dots), even accounting for the fact that PBL 101 Cohort 1 participants make up 28 percent of the PCW network.

Figure 31. PCW teachers who did and did not participate in PBL 101 in Cohort 1 were nearly equally chosen by survey respondents as people to whom they go for advice or with questions

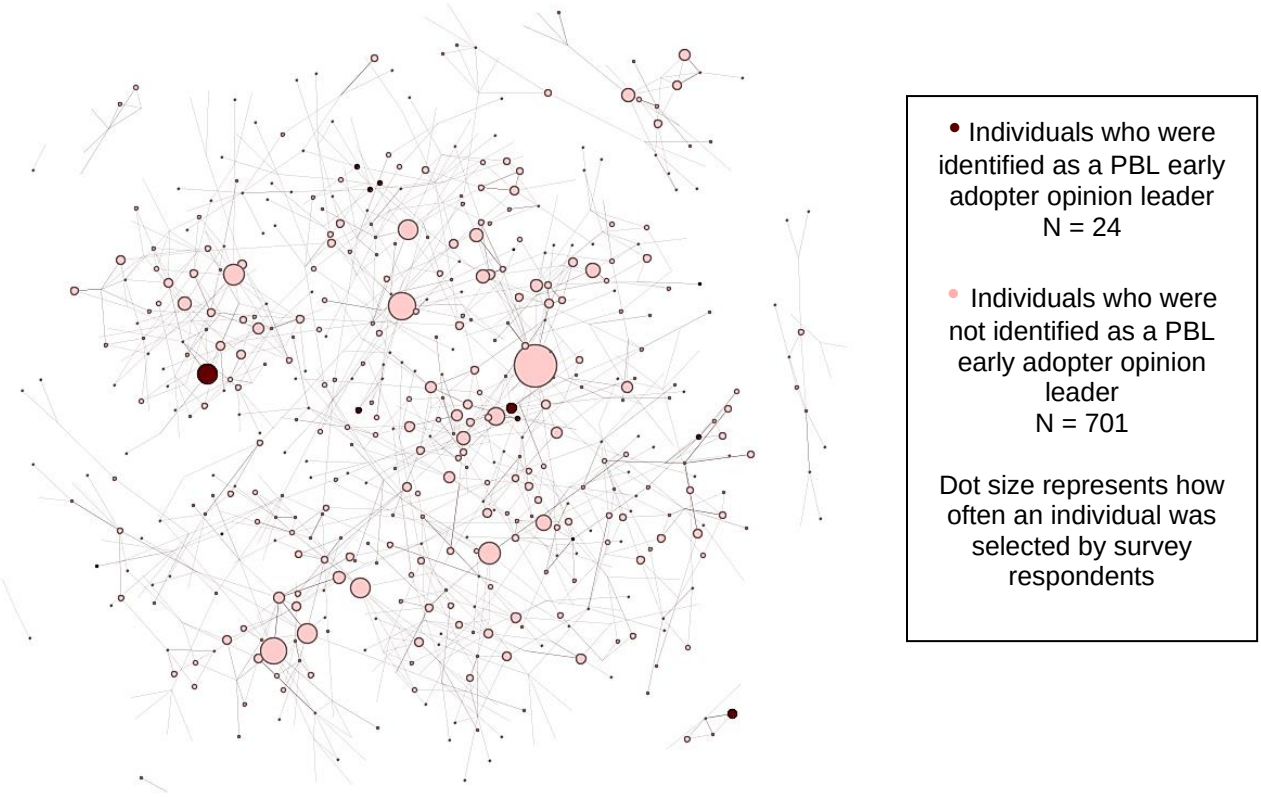


Source: Education Northwest analysis of teacher survey data.

In PCW, PBL early adopter opinion leaders identified by school leadership are not notably different in how often they were chosen by other teachers compared with others in the network, nor are they significantly more likely to teach a project or a higher-quality project in Year 1. This means PBL early adopter opinion leaders identified by school leadership were not identified as opinion leaders by the survey and that they were not more likely than other teachers to adopt PBL by teaching a project (56 percent vs. 52 percent). However, other teachers who were identified as opinion leaders through the survey (high in-degree centrality) were significantly more likely to teach more projects lasting eight or more hours of class time. These are not necessarily the same individuals identified by the complex area as PBL early adopter opinion leaders.

Figure 32 represents the network for PCW survey respondents, where the size of the dot indicates how often an individual was chosen in the survey. Dark red dots represent individuals who were identified as PBL early adopter opinion leaders, and the light red dots represent individuals who were not identified as PBL early adopter opinion leaders. Although a few PBL early adopter opinion leaders are visible on the map as individuals chosen in the survey, they are underrepresented as a proportion of their presence in the overall network.

Figure 32. PCW survey respondents selected early adopter option leaders as people to whom they go for advice or with questions at similar rates as other teachers

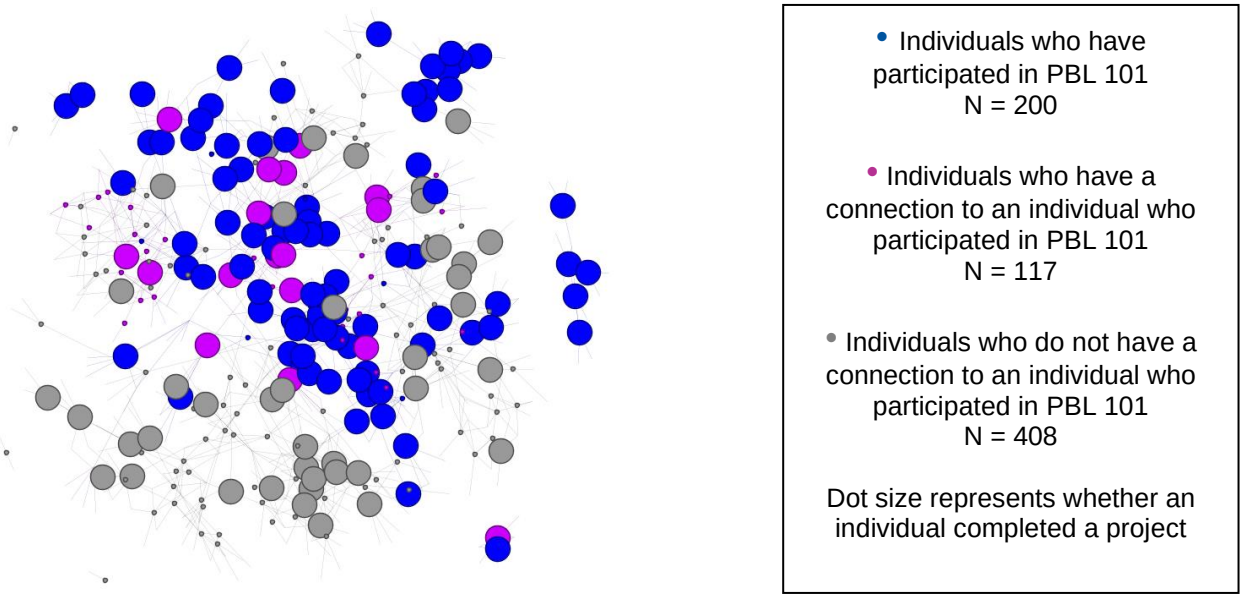


Source: Education Northwest analysis of teacher survey data.

To understand diffusion of information from individuals taking PBL 101 to others in their schools and school systems, we also analyzed the tie between PBL 101 participants and other teachers. For teachers who did not take PBL 101, we looked at whether the teacher either went to a PBL 101 teacher for advice or were identified by a PBL 101 teacher as an individual to whom they go for advice. These teachers are said to have a tie to a PBL 101 teacher in the analysis below.

Overall, PCW teachers who were tied to another teacher who participated in PBL 101 were not significantly different in whether they taught a project in Year 1. Figure 33 is a map of individuals by their connection to a PBL 101 participant, sized by whether they completed a project. Note that blue dots—or individuals who have participated in PBL 101—are mostly large dots (93 percent did a project). However, although purple dots—or individuals who are connected to a PBL 101 participant—are more often large dots (38 percent did a project) than gray dots—or individuals who are not connected to a PBL 101 participant (30 percent did a project)—this difference is not statistically significant.

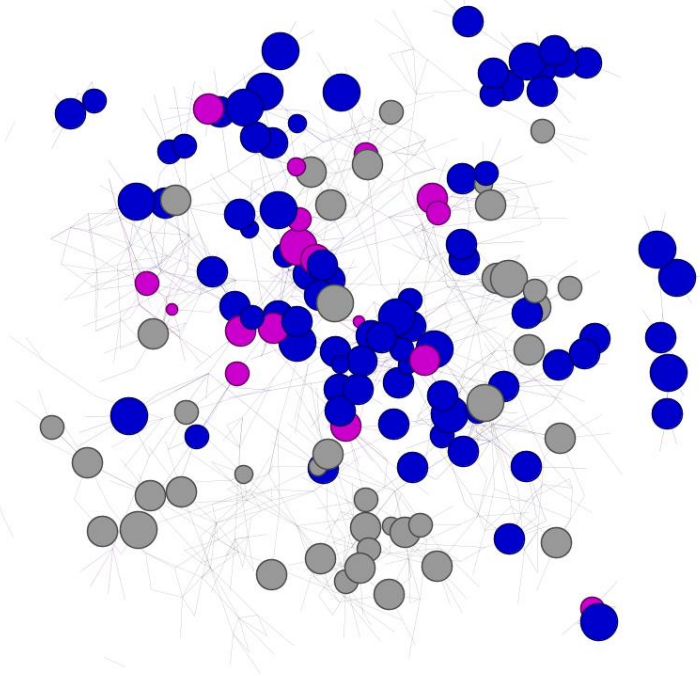
Figure 33. PCW Year 1 project facilitation by connection to PBL 101 participants



Source: Education Northwest analysis of teacher survey data.

Overall, PCW teachers who were tied to another teacher who participated in PBL 101 were not significantly different in the number of projects they taught over eight hours or in their project quality. Figure 34 is a map of individuals by their connection to a PBL 101 participant, sized by the quality of the project they reported on. Note that blue dots—or individuals who have participated in PBL 101—are mostly large dots (average project quality = 4.94). However, although purple dots—or individuals who are connected to a PBL 101 participant—have a lower average project quality (4.24) than gray dots—or individuals who are not connected to a PBL 101 participant (4.55)—this difference is not statistically significant.

Figure 34. PCW Year 1 project quality measured by connection to PBL 101 participants



- Individuals who have participated in PBL 101
  N = 200
- Individuals who have a connection to an individual who participated in PBL 101
  N = 117
- Individuals who do not have a connection to an individual who participated in PBL 101
  N = 408

Dot size represents the overall quality of projects that an individual reported on

Source: Education Northwest analysis of teacher survey data.

Appendix A: Teacher Survey

The survey was administered in the spring of 2019 using teacher contact information provided by each district/complex area. The survey was conducted on-line. Teachers were asked to reflect on their teaching during the 2018-19 school year. Teachers were asked to respond to questions about four topics: their experience with PBL, the projects they taught, the system conditions in the schools where they taught, and their professional social networks.

Teachers were asked a series of questions about their projects that were used to create a composite quality rating score for their projects. The rating questions were related to six of the eight Gold Standard Design elements: Challenging Problem, Sustained Inquiry, Student Voice and Choice, Critique and Revision, Authenticity, and Public Product. For each of the elements a teacher was either given a score of 1 or 0 depending on their answers to a question. A score of 1 indicates the project met the minimum threshold for that element and a 0 indicates they did not meet the minimum threshold. The composite quality rating was then created by adding up the assigned values for each element, creating a range of possible scores of 0 to 6.

Teacher Survey Sample

The survey was sent out to 2,003 teachers across both school systems and the overall response rate was 29 percent – 30 percent in PCW and 29 percent in MSD. In MSD, of the 298 teachers who completed the survey 70 percent (208) had taken the survey in the baseline year. In PCW, of the 284 teachers who completed the survey 73 percent (208) had taken the survey in the baseline year. For those teachers who took the survey in both years the survey responses were combined to compare changes from the baseline year to Year 1.

Overall, the percentages of teachers in the subgroups in Table A1 are not notably different than in the baseline survey. The only category of teacher that saw a notable decline in responses in MSD were elementary school teachers who went from 48 percent of respondents in the baseline survey to 41 percent of the respondents in the Year 1 survey.

Table A1. MSD spring 2019 teacher survey respondent characteristics compared with fall 2018 baseline

Survey respondent characteristics		**Baseline N = 512**		**Year 1 N = 298**	
Grade band	Elementary school	246	48%	121	41%
	Middle school	143	28%	84	28%
	High school	123	24%	93	31%
School cohort	Cohort 1	351	69%	173	58%
	Cohort 2	161	31%	125	42%
School scaling category	No PBL	101	20%	61	20%
	Pockets of PBL	302	59%	172	58%
	25% to 50% of classrooms	-	-	-	-

	50% to 74 % of classroom	60	12%	27	9%
	More than 75% of classrooms	36	7%	22	7%
	Schoolwide	13	3%	16	5%
School demographics	Above average: SPED	217	42%	117	39%
	Above average: EL	163	32%	99	33%
	Above average: FRPL	247	48%	133	45%
	Above average: students of color	259	51%	152	51%
PBL 101 participation	Cohort 1 participant	150	30%	87	29%
Leadership team	Leadership team member	46	9%	28	9%

Note: 208 of 298 Year 1 respondents also completed the baseline survey.

In the Year 1 survey, the number of elementary school teachers declined compared to the baseline survey (57 percent in Year 1 compared to 65 percent in baseline), this resulted in an increased percentage of the respondents being Intermediate and High school teachers (table A2). The percentage of Cohort 1 teachers responding to the survey was 54 percent compared to 50 percent in the baseline survey.

Table A2. PCW spring 2019 teacher survey respondent characteristics compared with fall 2018 baseline

Survey respondent characteristics		**Baseline N = 495**		**Year 1 N = 284**	
Grade band	Elementary school	323	65%	161	57%
	Intermediate school	71	14%	55	19%
	High school	101	20%	68	24%
School cohort	Cohort 1	246	50%	152	54%
	Cohort 2	249	50%	132	47%
School scaling category	No PBL	227	46%	138	49%
	Pockets of PBL	202	41%	103	36%
	25% to 50% of classrooms	66	13%	43	15%
	50% to 74% of classroom	-	-	-	-
	More than 75% of classrooms	-	-	-	-
	Schoolwide	-	-	-	-
School demographics	Above average: SPED	266	54%	171	60%
	Above average: EL	325	66%	179	63%
	Above average: FRPL	316	64%	182	64%
	Above average: students of color	375	76%	211	74%
	Above average: Native Hawaiian students	163	33%	106	37%
PBL 101 participation	Cohort 1 participant	165	33%	92	32%
Leadership team	Leadership team member	42	8%	*	*

Note: 208 of the 284 Year 1 respondents also completed the baseline survey.

Descriptive analysis

The educator survey was administered using Survey Gizmo. Upon completion of the survey administration period, the data were downloaded and imported into the statistical software Stata for cleaning and analysis. To analyze the data regarding the respondents' experience with PBL, reported use of Gold Standard Design Elements, and school-level conditions, we conducted basic descriptive analyses using tabulations and cross-tabulations of the data. The

survey data underwent further cleaning in preparation for the SNA and roster matching analysis, along with specialized analyses, which are described in detail below.

Teacher and Student Survey Overall Quality Score

The study involves the triangulation of student and teacher perspectives on project quality. The student survey assesses whether students experienced HQPBL, while the teacher survey asks about the use of Gold Standard Design elements. In order to facilitate triangulation across these data sources, we drafted an aligned composite measure of quality for each survey item (table A3), drawing upon the feedback of PBLWorks staff on the Gold Standard Design Elements Scoring Guidelines as well as the HQPBL framework.

These composite measures are intended to describe whether the project met a threshold for quality primarily for the purpose of triangulation. They are not meant to be a comprehensive indicator of HQPBL, since the surveys did not have space to investigate in-depth each Gold Standard Design Element or criterion for high-quality PBL. A composite score also enables us to increase our ability to conduct more nuanced statistical analyses related to project quality, particularly when examining diffusion within the SNA. For example, with a composite score can concisely assess change in project quality from baseline to Years 1 and 2.

Overall composite scores of 0 to 6 were tallied by totaling the scores across each design element. A score of 6 indicates that the project contained evidence of all six design elements measured.

Table A3. Quality composite scores for student and teacher surveys

Gold Standard Design Element	Student Survey Question, Response Option(s), and Scoring	Teacher Survey Question, Response Option(s), and Scoring
*Challenging Problem Or Question**	How did this project challenge you? a. I studied a problem or question that was difficult to solve. Score:1 point for a.	What was the primary focus of the project? a. A driving open-ended question that the whole class answered Score:1 point for a
Sustained Inquiry	How did this project challenge you? a. I worked on the project for many days or weeks. Score:1 point for a	What was the length of the project? a. 2–3 weeks b. 4 weeks or more Score:1 point for a or b
*Student Voice & Choice***	What steps did you take to complete your project? a. I made decisions about how I used my time. b. I made decisions about what resources to use.	Were students given the opportunity to make choices about the following project elements? a. Determining the central project topic or question) b. The text and resources used to complete the project

	c. I planned what tasks I needed to do. Score:1 point for a, b, or c	c. Which classmates they collaborated with during the project d. The format of the final product created (e.g., presentation, poster, video) e. How they used their project time f. Organizing the tasks needed to complete the project Score:1 point for a, b, c, d, e, or f
*Critique & Revision****	How were comments or suggestions part of this project? a. I used comments or suggestions from my teacher or other students to improve my work Score:1 point for a	When did students get feedback on their project-related work? a. While working on the project Score.5 point for a
		Who provided feedback to students about their project? a. Peers Score.5 point for a
Authenticity	Why was this project important to you or to other people? a. I learned information I am interested in. b. The project can help solve a problem in my school or community. c. I was able to make choices about my work on this project. d. I used the *same* tools, technology, or equipment that are used by people outside of school. Score:1 point for a, b, c, or d	Which of the following elements apply to the project you assigned to your class? a. Focused on a real need in our school or community b. Reflected my students' personal concerns, interests, or identities c. Used real-world tools and processes d. Solved a problem like those faced by people outside of school e. Resulted in a product that could be used by other people Score:1 point for a, b, c, d, or e
Public Product	How did you share what you learned with other people? a. I gave presentations to students, parents, or people outside of my classroom. b. I gave presentations to people outside of school. Score: 1 point for a or b	Did students produce materials (e.g., presentation of their work, tangible product such as a website, video, or brochure) that were seen by people outside their own classroom? a. Yes Score: 1 point for a

*Intellectual Challenge & Accomplishment in the HQPBL Framework

** Drawn from Authenticity and Project Management in the HQPBL Framework

*** Drawn from Reflection in the HQPBL Framework

SNA

A foundational assumption of this project is that teacher social networks influence the diffusion of quality PBL in schools and across school systems. According to diffusion of innovation theory (Rogers, 2003), the social networks of "opinion leaders" play a critical role in diffusing innovation to others in an organization and across a system. Opinion leaders regularly influence the mindset and behavior of others through informal means and relationships rather than positional authority.

At the beginning of this project, MSD and PCW leaders were asked to utilize diffusion of innovation theory to strategically select individuals and schools to receive the first round of PBLWorks services that might support the diffusion of information from those opinion leaders to others in their schools and in the school system. They created system- and school-level scaling maps to document the rationale for selecting schools to participate in PBLWorks services in Cohort 1 and then selecting the individuals to participate in PBL 101 training, including those who were noted as "PBL early adopter opinion leaders" by leadership. The assumption of this approach is that starting with opinion leaders who were well-connected and already teaching with projects at baseline will facilitate the diffusion of HQPBL within schools and across school systems.

To investigate the patterns of diffusion across these two school systems, we used SNA. SNA is used to analyze the relationships between individuals where information or other resources are exchanged (Wasserman & Faust, 1994). We use SNA to determine whether those identified as opinion leaders by school leadership using the diffusion of innovation theory was an individual who is chosen regularly by their peers as someone they would go to for advice.[25] We did this by asking teachers in both the baseline (2017–18) and in the Year 1 (2018–19) teacher surveys, "Who did you go to most often for advice or with general questions related to content knowledge, your instructional practice, or navigating school systems (i.e., figuring out school management or bureaucracy)?" By mapping relationships in and across schools, we can identify potential opportunities and challenges in how information about quality PBL might flow between individuals who have received this information and those who have not. We used ORA software[26] to visualize and analyze the networks.

Description of baseline social networks. Table A4 provides a descriptive overview of all individuals who are included in the SNA maps in the baseline in both MSD and PCW based on the results of the survey. These individuals either participated in the survey or were identified by a survey respondent—together forming the social network of each school system.

In MSD, 419 survey respondents identified 1,677 relationships with 891 individuals working in the district and 11 individuals working outside the district. In PCW, 434 survey respondents identified 1,764 relationships with 783 individuals working in the complex area and 30

[25] In SNA, this measure is referred to as "in-degree centrality" (Wasserman & Faust, 1994).
[26] http://www.casos.cs.cmu.edu/projects/ora/

individuals working outside the complex area. The number of survey respondents, as well as the number of individuals identified by survey respondents, was comparable across the two school systems.

Table A4. MSD and PCW survey respondents identified a similar number and type of individuals in their social networks at baseline (2017-18)

Network Member Characteristics		MSD (n = 902)		PCW (n = 813)	
Location	School-based staff	880	98%	767	94%
	District/complex area office staff	10	1%	17	2%
	Individuals outside the district/complex area	11	1%	30	4%
Role	Teacher	734	81%	694	85%
	School-level administrator	52	6%	41	5%
Cohort membership	From a Cohort 1 school	305	34%	392	48%
	From a Cohort 2 school	575	64%	373	46%
	Early adopter opinion leaders	45	5%	20	2%
PBL participation	Cohort 1 PBL 101 participant	201	22%	214	26%
	Leadership team member	65	7%	94	12%

Note: Individuals are represented in more than one category.

Description of Year 1 social networks. Table A5 provides a descriptive overview of all individuals who are included in the SNA maps in Year 1 in both MSD and PCW based on the results of the survey. These individuals either participated in the survey or were identified by a survey respondent—together forming the social network of each school system.

In MSD, 282 survey respondents responded in spring 2019 for Year 1, 210 of these respondents took the survey in baseline, as well. These survey respondents identified 1,201 relationships with 715 individuals working in the district and 18 individuals working outside the district. In PCW, 277 survey respondents identified 1,172 relationships with 713 individuals working in the complex area and 12 individuals working outside the complex area. The number of survey respondents, as well as the number of individuals identified by survey respondents, was comparable across the two school systems.

Table A5. MSD and PCW survey respondents identified a similar number and type of individuals in their social networks at Year 1 (2018-19)

Network Member Characteristics		MSD (n = 733)		PCW (n = 725)	
Location	School-based staff	715	98%	695	96%
	District/complex area office staff	9	1%	9	1%
	Individuals outside the district/complex area	9	1%	12	3%
Role	Teacher	592	81%	614	85%
	School-level administrator	50	7%	39	5%
Cohort membership	From a Cohort 1 school	423	59%	152	46%
	From a Cohort 2 school	292	41%	132	46%
	Early adopter opinion leaders	41	6%	9	3%
PBL participation	Cohort 1 PBL 101 participant	165	23%	92	32%
	Leadership team member	59	8%	6	2%

Note: Individuals are represented in more than one category.

The survey focuses on teacher social networks, but administrators and district/complex area office staff members play key roles in connecting individuals across networks. We will note when the analysis includes administrators and district/complex area office staff members who are identified by teachers.

Not all teachers in MSD or PCW completed the survey, and the networks used for this study do not represent all the relationships in either school system. Therefore, although we can talk generally about the different structures of the two networks represented by MSD and PCW, there may be different relationships through which PBL knowledge might spread that are not captured here. This is a challenge for most studies using SNA and was considered during the analysis.

Finally, there were a few analyses that were not included in the reporting. The teacher survey also provides information for tracking changes from baseline to Year 1 regarding awareness of PBL and use of quality PBL practice over time. However, as the response rate for teachers taking the survey at both baseline and year 1 was low (29 percent for both MSD and PCW) and not all the respondents taught a project, we were unable to report on substantive changes for individuals. Additionally, survey respondents were given the opportunity to identify individuals outside their school that they go to for advice; however, only 28 individuals from MSD and three individuals from PCW identified a cross-school connection in Year 1. Therefore, this analysis is not included in the findings due to its limited scope.

Specifics from reported items are described in table A6.

Table A6. Centrality measures and project participation for network members, Year 1

	MSD (n = 733)				PCW (n = 725)			
	N	Mean in-degree centrality	Did a project	Project quality rating	N	Mean in-degree centrality	Did a project	Project quality rating
School leadership team	59	7.6	96%	5	85	7.3	50%	5.3
Others	674	4.1	55%	4.7	640	3.6	52%	4.7
PBL early adopter opinion leaders	41	6.9	69%	5.2	24	4.7	56%	5
Others	692	4.3	45%	4.7	701	4	52%	4.7
Individuals who have participated in PBL 101	165	5.4	94%	5.1	200	3.9	93%	4.9
Individuals who have a connection to an individual who participated in PBL 101	160	4	53%	4.6	117	4.3	30%	4.6
Individuals who do not have a connection to an individual who participated in PBL 101	408	4.1	39%	4.2	408	3.9	38%	4.2

Matching Class Rosters with Teacher Survey Results

To determine the extent to which students, including students furthest from opportunity, experience two high-quality projects each year, the research team matched teacher survey reports of project facilitation with class rosters and student demographic data from the same school year. Education Northwest received a list of students with their demographic and course enrollment information from MSD and PCW for both 2017–18 and 2018–19.

Individual student records were matched with teachers who participated in the survey by using the course enrollment file that included teacher names for both MSD and PCW. In MSD, matching was also done based on teacher email address, which was available for teachers who were also included in the 2018–19 staff roster list.

The matched students were then assigned a number of projects experienced by each of their assigned teachers during the school year. Then the number of projects taught in each student-teacher pair was added together to create a single number of projects experienced for each student. This number was used to determine if a student was exposed to no projects, 1 project, or 2 or more projects each year. If a student was not matched to any teacher on the survey the student was excluded from the analysis of students by subgroup since we cannot infer if they did or did not experience a project during the given school year.

Roster matched students were also matched with the quality composite rating as reported by their teachers. If a teacher reported teaching a project and completed the project quality items they were given an overall quality composite score, which was assigned to the students. A smaller number of students had a project quality score than the number of students matched to a teacher survey because not all teachers taught a project or completed the rating questions. If a student had multiple teachers who had a project quality rating the higher rating was used for the analysis.

MSD Roster-Matching Results

The roster matching analysis was done only on the students for which there was a match to at least one teacher who took the teacher survey. Therefore, we compared the matched students to the total student population reported in the 2018-19 student rosters to ensure the demographics of the student population in the district was close to the matched student population. The percentage of students matched to a teacher was 78 percent and none of the demographic groups were over or underrepresented in the matched sample by more than 2 percentage points indicating that the matched population does look like the overall student population in the district (table A7). In MSD, 69 percent (7,525) of the matched students had a quality rating matched to them from the teacher survey.

Table A7. Percentage of students in MSD compared with roster-matching results for race/ethnicity, students receiving special education services, and English learner students

Student characteristics	Percentage of total students in district (N = 13,606)	Percentage of total students matched with teacher survey (N = 10,669)
Asian	5%	5%
American Indian/Alaska Native	*	*
Black/African American	10%	10%
Hispanic/Latino	24%	26%
White	56%	55%
Pacific Islander	*	*
Two or more races	5%	5%
Received special education services	17%	17%
English learner	14%	15%
Free or reduced-price lunch eligible**	60%	60%

* indicates less than 1 percent.

** Free and reduced-price lunch eligible student percentages were reported by MSD after roster matching to protect student privacy

Source: Teacher survey data matched with student rosters

PCW Roster-Matching Results

The analysis of students who experienced a project was only done for students who could be matched to a teacher from the teacher survey. Therefore, it was important to compare the matched students to the total student population reported in the 2018–19 student rosters to ensure the demographics of the student population in the district was close to the matched student population. The percentage of students matched to a teacher was 68 percent. None of the demographic groups were over or under-represented in the matched population by more than 5 percentage points. The Asian racial subgroup only made up 52 percent of the population in the student roster but did make up 57 percent of the matched students; no other subgroup had a greater than 3 percent difference from the total population (table A8). In PCW, 80 percent (7,518) of the matched students had a quality rating matched to them from the teacher survey.

Table A8 Percentage of students in PCW compared with roster-matching results for race/ethnicity, students receiving special education services, English learner students, and students eligible for free or reduced-price lunch

Student characteristics	Percentage of total students in district (N = 13,948)	Percentage of total students matched with teacher survey (N = 9,439)
Asian	52%	57%
American Indian/Alaska Native	*	*
Black/African American	*	*
Hispanic/Latino	11%	9%
White	2%	2%
Pacific Islander	20%	20%
Two or more races	14%	11%
Received special education services	9%	8%
English learner	15%	15%
Eligible for free or reduced-price lunch	50%	49%

* indicates less than 1 percent.

Source: Teacher survey data matched with student rosters

Appendix B: Focus Groups

Typically conducted with groups of seven to 10 people who share a common experience, focus groups are especially useful for gathering information about group processes (Marshall & Rossman, 2006). The open-ended nature of focus groups provides richer and more nuanced data than interviews or forced-format surveys. In this project, we use focus groups to explore educator perspectives of PBL implementation, scaling, and diffusion. The primary purpose of the focus groups is to provide more detailed information about the diffusion process and implementation conditions (RQ2) from the perspective of multiple stakeholders (teachers, school administrators, and district/complex area administrators). In designing these protocols, we drew on PBLWorks' leadership rubrics and research on teacher motivations, practices, and school-level conditions related to PBL (for a summary, see Condliffe, 2017).

Sample focus group questions (from the principal and school leadership team protocol) include:

1. **Which strategies from the scaling map did you find most effective supporting PBL implementation across your school? Please indicate any new strategies your team developed over the year.**
    a. *Prompt for effective strategies for supporting innovators and early adopters*
    b. *Prompt for effective strategies for engaging and supporting majority and late majority*

2. **What do you think made these strategies so effective with each of these groups of teachers?**

3. **Which strategies were less effective, and why?**
    a. *Prompt for challenges in supporting innovators and early adopters*
    b. *Prompt for challenges in engaging and supporting majority and late majority*

4. **What are some signs that that your school is making progress with PBL?**
    a. *Prompt for changes in schoolwide culture and teacher engagement*
    b. *Prompt for changes in motivation and demand*
    c. *Prompt for changes in classroom practice*
    d. *Prompt for changes for students: mastery of core content, collaboration, communication, and critical thinking/problem solving*

Data collection. In each school system, we conducted one-hour focus groups with teachers, principals, school-level leadership team members, and district/complex area staff members. Education Northwest conducted 10 focus groups, 6 in MSD and 4 in PCW. A total of 54 individuals participated in focus groups between March and June, with 22 from MSD and 32 from PCW (table B1).

Table B1. Focus group participants by role and school system (N = 54)

Role	MSD participants	PCW participants
District or complex area administrators	3	4
Cohort 1 Principals	4	9
Cohort 1 Leadership team members	6	10
Cohort 1 and 2 Teachers	9	9

Education Northwest collaborated with MSD staff to schedule their focus groups and took the lead in recruiting participants. Recruitment included sending multiple e-mails directly to all leadership teams and cohort 1 teachers, in addition to recruiting through the April teacher survey. Unfortunately, the in-person focus groups scheduled for May 28 and 29 suffered from low teacher turnout due to conflicts with preparing students for exams. Education Northwest worked with the teacher's union and district to schedule an additional virtual focus group for June. We conducted intensive e-mail recruitment again and received a better turnout for this group. PCW staff scheduled their focus groups and recruited participants. All PCW focus groups were conducted virtually on April 30 and May 30 in conjunction with the complex area-wide Presentation of Learning event. Unforeseen circumstances prevented in-person by facilitation by Education Northwest on the date originally planned and it was decided with PCW that virtual focus groups were preferable than rescheduling the groups for another date.

All focus group data were collected via written notes and audio recording, de-identified, and stored securely on our organizational servers. Two analysts used ATLAS.ti to manage and code the data. Analysis involved both deductive and inductive coding (Marshall & Rossman, 2006), as the study is both testing established frameworks related to PBL quality design, facilitation, and experience and developing theoretical insights related to the diffusion of innovation. First, data were coded using a scheme organized by key research issues:

a. Diffusion process outcomes (e.g., increased educator engagement)
b. Deeper learning outcomes for students (e.g., communication)
c. System conditions (e.g., vision)
d. Scaling strategies (e.g., messaging)
e. Overall challenges and recommendations

Reports were generated based on the frequency of codes in each school system and participant type (e.g., teachers). Next, we produced analytic memos summarizing the key themes in each of these issues, patterns in the data by school system or participant type, and illustrative quotes and examples.

Appendix C: Project Plans

Upon completion of the teacher survey, teachers were asked to upload a recent project plan. Education Northwest downloaded the plans and cleaned the data, using a spreadsheet to document key characteristics of the plans received (e.g., grade, subject, school). For MSD, 19 plans were received from eight cohort 1 schools, one plan was received from a cohort 2 school, and two plans were received that were unable to be identified. For PCW, 18 plans were received from six cohort 1 schools, two plans were received from two cohort 2 schools, and five plans were received that were unable to be identified. Through purposeful sampling, we selected at least 10 plans from each district, representing a range of Cohort 1 schools, grades, and subject areas. As indicated below (table C1) 11 plans were analyzed from 8 cohort 1 schools in MSD 10 plans were analyzed from 6 cohort 1 schools in PCW.

Two analysts reviewed the plans using the Gold Standard Design Elements Scoring Guidelines (table C2). The guidelines were developed in consultation with PBLWorks to determine whether the plans met a basic threshold of quality for each of the eight Gold Standard Design Elements. Plans received a score of 1 for each design element threshold met, for a total possible score of 8. Evidence was tracked and scores were tallied using Excel. These data were then triangulated with teacher survey data.

Table C1. Project plans received and analyzed

	MSD		**PCW**	
	Received	*Analyzed*	*Received*	*Analyzed*
Cohort 1	19	11	18	10
PBL template used	18	9	21	10
Primary subjects represented	Included subjects in the *sciences*, *English language arts*, and *math*	Included subjects in the *sciences*, *English language arts*, and *math*	Included subjects primarily in the *sciences*, *English language arts*, *math* and other unknown subjects	Included subjects in the *sciences* and *English language arts*
Grade bands represented	Elementary: 7 Middle school: 13 Unknown: 2	Elementary: 4 Middle school: 7	Elementary: 14 Intermediate school: 6 Unknown: 4	Elementary: 7 Intermediate school: 3
Total number of schools	9*	8*	8**	6**
Number of plans with multiple teachers	11	6	18	9
Number of plans designed by a PBL 101 teacher	16	8	13	10

Table C2. Gold Standard Design Elements Scoring Guidelines for project plans

Gold Standard Design Element	Criteria	Scoring	Evidence
Student learning goals	Is the project focused on teaching key: a) knowledge derived from standards or b) skills derived from standards?	Yes =.5 No = 0	Standard named: Example of knowledge/skill: Standard inferred:
	Does the project plan *explicitly* state a focus on one or more success skills, such as: a) critical thinking/ problem-solving, b) collaboration, or c) communication?	Yes = .5 No = 0	Success skills explicitly stated: • Critical thinking/problem-solving • Collaboration • Communication • Other: Indicate success skills inferred:
Challenging problem or question	Is the project organized around a: a) challenging problem or b) question?	Yes = 1 No = 0	Example of problems/questions:
Sustained inquiry	Did the project last two or more weeks? AND Does the project provide opportunities for students to: a) ask questions, b) find and use resources/data, or c) develop their own answers to questions?	Yes = 1 No = 0	Types of opportunities: • Ask questions • Find and use resources/data • Develop their own answers Example:
Authenticity	Does the project provide opportunities for students to: a) use real-world processes, tools, or quality standards; b) make a real impact; or c) explore their own concerns, interests, and identities?	Yes = 1 No = 0	Types of authenticity: • Use real-world processes, tools, or quality standards • Make a real impact • Explore their own concerns, interests, and identities Example:

Student voice and choice	Does the project provide opportunities for students to make choices about: a) what they learn or b) how they learn?	Yes = 1 No = 0	Type of choices: • Students choose what they learn • Students choose how they learn Examples:
Reflection	Does the project provide opportunities for students to reflect on their learning?	Yes = 1 No = 0	Examples of reflection:
Critique and revision	Does the project include processes for students to: a) give feedback, b) receive feedback, and c) use the feedback to revise their work?	Yes = 1 No = 0 (Must have a, b, and c to be yes)	Type of critique and revision: • Students give feedback • Students receive feedback • Students use the feedback to revise their work Example:
Public product	Does the project ask students to demonstrate what they learn by creating a product (artifact, presentation, performance, or event) that is shared with people beyond the classroom?	Yes = 1 No = 0	Example:

Appendix D: Student Survey (MSD Only)

As a part of this project, in MSD, students in grades 4–8 were asked to complete an online survey at the completion of a project. Students were asked a series of questions about the project they just completed, and the corresponding data collected were used for descriptive analysis and to create a composite quality rating that matched the teacher composite quality rating from the teacher survey.

The survey responses were later matched to the student roster using the name provided by the student in the survey to examine the student responses by subgroup. Students in seven schools completed the survey, with over 90 percent of the responses coming from four schools and just over 50 percent of the responses coming from one middle school. Most students who took the survey completed it (94 percent) and were matched to the student roster (95 percent). A large portion of the students who completed in the survey were in grade 6 (42 percent) (table D1).

Table D1. MSD student survey response information

	Percentage of respondents (N = 551)
Complete responses	94%
Matched to student roster	95%
Elementary school	34%
Middle school	66%
Grade 4	22%
Grade 5	12%
Grade 6	42%
Grade 7	6%
Grade 8	18%
English learners	8%
Special education	12%
Asian	4%
Black/African American	7%
Hispanic/Latino	23%
White	59%
Two or more races	7%

Appendix E: Year 2 Research Plan

The project will repeat a second round of data collection in Year 2 using the same methods as Year 1. In November 2019, the RPP will meet to schedule data collection activities, such as the student survey, teacher survey, and site visits. We will discuss strategies for refining the data collection timeline and processes to increase response rates from teachers. We will also discuss ways to support teachers in conducting the student survey.

Table E1. Year 2 research plan

Fall 2019	Winter 2020	Spring 2020	Summer 2020	Fall 2020
Support schools in collecting and tracking student consent forms (Cohorts 1 and 2) Refine data collection instruments and processes Update any data-sharing agreements and/or IRB materials as needed	Support grade 4–12 student survey administration (Cohorts 1 and 2) Meet monthly with RPP to plan data collection	Support grade 4–12 student survey administration (Cohorts 1 and 2) Conduct teacher survey (Cohorts 1 and 2) Conduct educator focus groups (Cohort 2) Meet monthly with RPP to plan data collection	Data cleaning and analysis Produce school-level memos with student survey results Meet monthly with RPP to discuss emerging findings	Discuss findings with RPP and advisory council Produce final reports and presentations

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