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"The Positive Impacts of a Professional Learning Community Model on Student Achievement in Small Schools"

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The Positive Impacts of a Professional Learning Community Model on Student Achievement in Small Schools

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Abstract: This study explores the impact of professional learning communities on student achievement in a small school setting. Aaron Hansen's book, *How to Develop PLCs for Singletons and Small Schools*, offered a guide for arranging vertical, grade-level teams with one teacher per grade level at one private, K–8 school. The faculty engaged in high quality, effective professional development using PLC objectives and norms to analyze NWEA MAP data. They adapted instructional practices and implemented formative assessments to influence student growth in math and reading scores. Results indicate that the PLC training that took place between the Fall and Winter MAP testing cycles positively impacted student growth results from Winter to Spring tests. Research limitations are addressed in the discussion section.

Keywords: professional learning communities, student achievement, professional development, small schools

While professional development opportunities for teachers and administrators across the nation are abundant, frustration quickly sets in upon the return to schools and classrooms to implement newly learned practices. Adapting new ideas and practices while maintaining fidelity to the original professional development goals and objectives often results in a watered down, perfunctory version of the intended model. Lieberman and Mace (2010) point out that teachers "have long perceived professional development, though well intentioned, to be fragmented,

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disconnected, and irrelevant to the real problems of their classroom practice" (p. 77). Large professional development —Professional Learning Communities (DuFour et al., 2008), Kagan Collaborative Learning Structures (Kagan, 2013), Advanced Placement, (AP Central, 2023)— that are embraced by education communities often require adaptations and modifications to meet the school, academic, and specific student needs. Differentiated models for these adaptations and modifications are rarely part of the training. This is especially true for small private and small charter schools. This article provides a snapshot of the way in which one small private school successfully implemented data driven Professional Learning Communities while maintaining the foundational elements of the model.

Background

A new principal began her work at a small, private Catholic school in Kentucky in 2019 prior to the COVID-19 pandemic. When the time came for an administrative change, she was eager to step in and lead the school. At the time she became principal, there were approximately 135 students enrolled with just enough to allow one teacher per grade level in the K–8 school.

The new principal spent her twenty-year teaching career in the building preparing for this role. She faced many challenges as a new administrator, but she prioritized curriculum alignment based on low school-wide Northwest Evaluation Association's Measures of Academic Process (MAP) scores. Committed to her goal, she invited two of her veteran teachers to join her in attending monthly professional development sessions on Professional Learning Communities (PLCs) during the school day at a local university. The meeting series advertised an opportunity to learn about Professional Learning Communities designed specifically for private schools; however, she and her teachers found the sessions to be generalized toward large schools with multiple teachers and classes at each grade level and failed to yield what Koellner and Jacobs (2015) define as "high-quality [professional development], organized around content, process, and structure . . . focus[ed] on students' thinking and learning" (p. 51). Additionally, there was no discussion about how to implement PLCs in small school settings during these sessions.

In her quest to find a way to implement PLCs with modifications due to the limitations of having only one teacher per grade level while maintaining fidelity to the model, the principal contacted me, a member of the Education Faculty at a local Diocesan University, for consultation. In the early stages of our work together, we discovered Aaron Hansen's (2015) book, *How to Develop PLCs for Singletons and Small Schools*. This was a guided adaptation of the implementation of Professional Learning Communities we were looking for. This model not only provided a guide for high quality, effective professional development, but also provided a forum to implement an innovative teaching and learning community, as Wenger et al. (2002) defined as: a group of practitioners sharing common

concerns, sets of problems, or passions about a topic, who deepen their knowledge and expertise by ongoing interaction toward a common goal (in Hadar & Brody, 2012).

As we embarked on our professional development and PLC implementation journey, our research considered the following question: Would the implementation of the vertical Professional Learning Community model positively impact student achievement and professional practice in a small school setting? It is important to note that PLCs in their purest form are a continuous, ongoing process and the principal and the faculty were committed to this "process of conducting schooling that has a profound impact on the structure and culture of the school and the assumptions and practices of the professionals within it." (Solution Tree, 2023).

Research on Professional Learning Communities

Richard and Rebecca DuFour, and Robert Eaker (2008) brought the concept of Professional Learning Communities (PLCs) in education settings to life. The DuFours and Eaker introduced and extensively researched, in-depth insight for a focused, student-centered school improvement lasting fifteen years to present. The foundation of PLC work is a collaborative approach to teaching and learning in which school culture and climate shift from teacher-centered to student-centered. PLCs are built on shared knowledge focused on what students are learning and ensure that students have access to an equitable, aligned curriculum. On a large scale,

> The PLC is the larger organization and not the individual teams that comprise it. While collaborative teams are an essential part of the PLC process, the sum is greater than the individual parts. Much of the work of a PLC cannot be done by a team but instead requires a schoolwide or districtwide effort. (Solution Tree, 2023, *What Are Professional Learning Communities* section, para. 3).

Buy-in and long term commitment to PLC practices requires short-term vision for administrators and district officials and long-term commitment for accurate, purposeful implementation. A district-wide PLC initiative calls for, "a focus on learning, collaborative teams, collective inquiry, action orientation, and continuous improvement." Thus, the PLC model at the school level functions as the building block of the larger collaborative group. (Solution Tree, 2023)

An ideal model PLC structure at the school level encompasses teachers meeting with their grade-level partners for sessions in which they examine student data based on common formative assessments and design instruction to address student needs. However, moving this theory into practice carries barriers and potential failure if the model is over-modified. DuFour (2004) acknowledged factors that lead to failed PLC models:

> The movement to develop professional learning communities can avoid the cycle of failed PLC initiatives (implementation problems that fail to bring about desired results, ultimately leading to the abandonment of school reform) if educators reflect critically on the concept's merits or 'big ideas' that represent the core principles of PLCs. The big ideas include: Ensuring that students learn, a culture of collaboration, and a focus on results. (pp. 6–11).

When the big ideas are implemented and followed, this culture shift has the potential to result in quantifiable school-wide and district-wide improvement. Existing research indicates there are several essential characteristics of PLCs that are effective for teacher learning: a shared goal and focus on a concrete outcome; collective focus on student learning; reflective dialogue; collaboration and active participation; structured and guided activities having a relation to practice; trust; leadership; stakeholder support; and individual prior knowledge and motivation (Andrews & Richmond, 2019, p. 409).

The PLC model has been nationally recognized and applied in school settings all over the country as a collaborative approach to improving classroom instruction. Horn et al. (2017) cite multiple sources (see also DuFour & Fullan, 2012; Hord, 2004; Lieberman & Miller, 2008) to support the notion that teacher collaboration is widely presumed to contribute to instructional improvement and professional learning. In a review of research on Professional Learning Communities, Vescio et al. (2008) found positive effects on student achievement when teacher collaboration was accompanied by "structured work that was highly focused on student learning" (in Horn et al., 2017, p. 15). Although this affirms PLC practices, the necessary support needed to guide the work is often not enough to maintain fidelity to the DuFour's big ideas, consistent with the realities small schools encounter when looking for ways to not only implement PLCs, but to maintain and evolve the practices over an extended period of time. Modifying the format of PLCs to meet the needs of small schools while maintaining fidelity to the model can be a daunting task. However, Prenger et al. (2019) cited five interconnected, defining variables for successful PLCs:

> First, reflective dialogue is about the extent to which teachers engage in professional dialogues about relevant educational subjects. Second, deprivatization of practice refers to the activity that teachers observe each other's classes with the aim of giving and receiving feedback for improvement. Third, collaborative activity refers to the extent to which teachers professionally engage with others within the PLC context. Fourth, shared goals mean the extent to which teachers agree with the PLC or school's mission and its principles. Finally, the collective focus on student learning refers to the mutual commitment of teachers for improved student achievement. (p. 442).

The National Catholic Educational Association (NCEA) makes no exception to this evidence-based, best professional practice as PLCs are included in the National Standards and Benchmarks for Effective Catholic Elementary and Secondary Schools (NSBECES). Several standards and substandards, as shown in Table 1, specifically reference curriculum alignment and professional learning communities (NCEA, 2023). The NSBECES support the value of PLCs and their relevance to Catholic education. Standard 7 addresses curriculum alignment and PLCs to set expectations for continuous curriculum assessment and improvement that impact student achievement. Standard 8 addresses assessment methods and practices that are inherent to the DuFour, DuFour, & Eaker (2008) PLC model (NCEA, 2023).

Table 1

National Standards and Benchmarks for Effective Catholic Elementary and Secondary Schools

Standard	
7	An excellent Catholic school has a clearly articulated, rigorous curriculum aligned with relevant standards, 21st century skills and Gospel values, implemented through effective instruction.
7.1	The curriculum adheres to appropriate, delineated standards, and is vertically aligned to ensure that every student successfully completes a rigorous and coherent sequence of academic courses based on the standards and rooted in Catholic values.
7.7	Faculty collaborate in professional learning communities to develop, implement and continuously improve the effectiveness of the curriculum and instruction to result in high levels of student achievement.
8	An excellent Catholic school uses school-wide assessment methods and practices to document student learning and program effectiveness, to make student performances transparent, and to inform the continuous review of curriculum and the improvement of instructional practices.
8.3	Faculty use a variety of curriculum-based assessments aligned with learning outcomes and instructional practices to assess student learning, including formative, summative, authentic performance, and student self-assessment.
8.5	Faculty collaborate in professional learning communities to monitor individual and class-wide student learning through methods such as common assessments and rubrics.

Source: NCEA (2023)

Consistent with most national academic standards for public and private schools, the NSBECES adhere to the fundamental principles of PLCs, but they do not provide, nor are they meant to provide, a prescriptive approach to implementation. These standards are intended consultation points for teachers and administrators in their daily work.

Hansen (2015) provided an avenue for small schools to participate in PLCs in his book, *How to Develop PLCs for Singletons and Small Schools*. Hansen's (2015) model combined with

DuFour's (2004) big ideas, Andrews and Richmond's (2019) essential characteristics, and Prenger et al.'s (2019) defining variables introduces the concept of vertical teams in a setting similar to many local diocesan schools. Hansen (2015) proposes organizing into multi-grade level teams (Pre-school, Kindergarten, 1st; 2nd, 3rd, 4th; 5th, 6th, 7th, 8th) in order to begin the process of answering the four guiding questions that are central to PLC implementation: What do we expect students to learn? How will we know if students are learning? How will we respond when some students are not learning? How will we respond when students are learning (DuFour et al., 2008; Hansen, 2015)? Finally, common formative assessments are central to learning in any PLC model. These assessments help teachers determine how well they are teaching a concept, support teachers in learning from each other, inform teachers about which students need their learning extended, and inform students about their position in the learning process (Hansen, 2015, p. 5).

Methods

The initial and ongoing phases of this research took place at a diocesan parish and school in Kentucky. The sample included 118 students through grades K–8. The current student demographics are predominantly White (96%) and 4% Black or biracial. An average of one teacher per grade level teaches at this school and teachers in the middle school, grades 5–8, teach multiple grade levels. For example, the middle school math and middle school social studies teachers taught all fifth grade through eighth grade students. There were one full-time and two part-time English Language Arts teacher for grades 5–8.

Ten teachers took part in the PLC professional development. Seven of the teachers were responsible for math and/or reading MAP testing. Kindergarten, middle school Science, and middle school Social Studies were not tested, but the three teachers participated in PLCs. The middle school Social Studies teacher worked with middle school ELA, and the middle school Science teacher worked with the middle school math teacher.

Introducing and implementing the Professional Learning Community Model

A PLC structure for twelve full-time teachers and two part-time teachers based on Aaron Hansen's (2015) book, *How to Develop PLCs for Singletons and Small Schools* was implemented in the fall of 2020. Vertical teams which involved a "team of teachers who all teach the same subject at different grade levels" (Hansen, 2015) were established. Three vertical teams were determined: Kindergarten and first grade comprised the first; a second team included second, third and fourth grades; a third team was made up of fifth, sixth, seventh, and eighth grades. The teachers spent the 2020 fall semester in PLC training to acclimate to this model. This preparation and training step took intentional measures to prevent "collaboration lite" which is described by Mike Schmoker:

> Mere collegiality won't cut it. Even discussions about curricular issues or popular strategies can feel good but go nowhere. The right image to embrace is of a group of teachers who meet regularly to share, refine, and assess the impact of lessons and strategies continuously to help increasing numbers of children learn at higher levels. (Hansen, 2015, p. 4)

The principal shared her curriculum alignment goals with her faculty at the beginning of the 2020/2021 school year. She was transparent about the steps she was ready to take faculty through to improve student learning. Being transparent about how she wanted to use student achievement data via MAP testing was the first step in creating a culture of continuous improvement using data to inform classroom instruction. The teachers were asked to complete a short survey at the first faculty meeting in the fall to gauge their past experiences and enthusiasm about PLCs. Teachers indicated there was a great need to align the curriculum and improve instruction that would truly benefit the students. Thus, teachers seemed willing to buy into the PLC work they were about to do. The culture of trust Hansen (2015) referenced was established among the faculty when this PLC model was introduced. A "collective responsibility in which students were not *my* students and *your* students but *our* students" (Hansen, 2015, p.13) was in place. Advancing this positive culture centered on "collaboration and pedagogical innovation related to shared goals that are student-centered" (Cochran-Smith, 2015, in Andrews & Richmond, 2019, p. 408). These vertically aligned Professional Learning Communities fully intended to become part of a common assessment process in the first phase, a crucial element to the work as indicated by the research (DuFour et al., 2008; Hansen, 2015).

Historical MAP Growth Analysis

The Northwest Evaluation Association's Measures of Academic Process (NWEA MAP) Test is administered to over 12 million students across the United States in primary and secondary grade levels for math, reading and language usage. Students are usually tested multiple times during the school year (fall, winter, spring). Test scores are reported on the RIT (Rasch unIT) scale, which is a linear transformation of the logit scale units from the Rasch item response theory model (NWEA, 2020). All NWEA MAP data is confidential and password protected at NWEA.org. Reports are accessed by school administrators to share with teachers, parents, and students.

This school began administering the MAP test for the first time in the fall of 2019 for first grade through eighth grade. Shortly following winter 2020 MAP testing, the COVID-19 pandemic began. It is important to note that COVID-19 implicated MAP data results as students moved to virtual learning in the spring of 2020. Spring 2020 MAP tests were not administered at the height of the pandemic, thus leaving a gap between the winter 2020 and fall 2020 test cycles.

Fall 2020 MAP data served as a fresh benchmark to measure student achievement as PLCs were implemented. At the time the test was taken, the first grade had eight students in the class, thus it was deemed statistically insignificant by MAP for not having enough students and data could not be reported. The class grew to nine students for the following year and their data was reflected in future MAP data. Figure 1 and Figure 2 represent NWEA MAP Student Growth Summary reports which provided a visual representation of grade-level performance and an accessible place to begin MAP data discussions.

Figure 1

Fall 2020 Student Growth Summary Report for Math

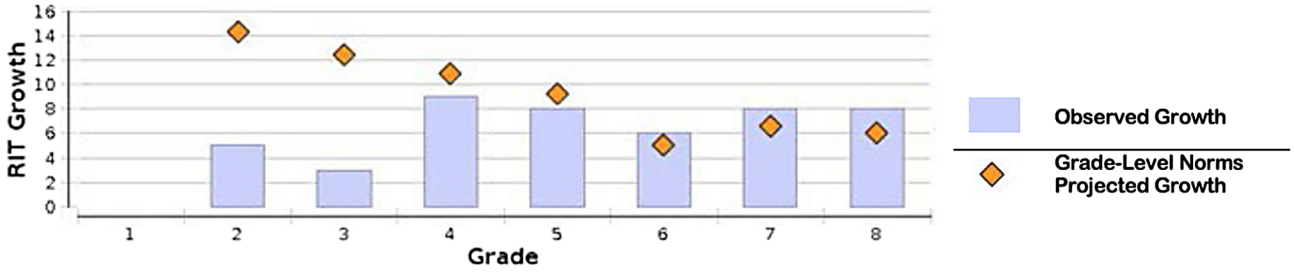
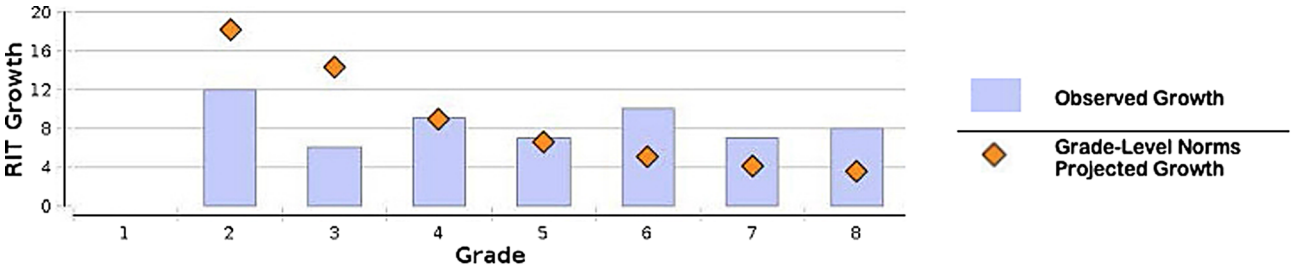


Figure 2

Fall 2020 Student Growth Summary Report for Reading



These reports became the starting points for grade-level MAP conversations in early PLCs. It was easy to identify growth according to RIT compared to grade level norms. While COVID-19 restrictions certainly impacted student growth from winter 2020 to fall 2020, the principal was determined to make changes. The principal set her sights not only on implementing PLCs to drive the data analysis process, but she also set a goal to close the achievement gaps indicated by the fall 2020 MAP data. The principal was unwavering in her intent to move her school to a position in which all students can achieve academic success at high levels.

PLC Meetings in Action

PLC meetings were formally introduced in a forty-five minute after school faculty meeting in late fall 2020. Prior to the first meeting, faculty completed assigned readings which included sections of the Hansen (2015) book and several articles including, "What is a Professional Learning Community?" (DuFour, 2004). During the faculty meeting, teachers discussed PLC norms and DuFour's four guiding questions: What do we expect our students to learn? How will we know if students are learning? How will we respond when students are not learning? How will we respond when students are learning (DuFour et al., 2008; Hansen, 2015)? Teachers took part in PLC training and building the foundation for implementing a collaborative approach to a school-wide curriculum and assessment cycle between the fall and winter MAP tests. Faculty were trained in PLC meetings following Hansen's (2015) *Continuum for Implementing a Singleton Collaborative Team* document. Several components of this continuum, such as identifying target skills, determining best practices for instruction, and desegregating data gathered from common assessments, were introduced as PLCs got underway.

Following introductory trainings, PLCs were set for one forty-five minute after school meeting per month until winter 2021 MAP testing took place in January of 2021. Additional PLC meetings took place during the school day. The principal developed a coverage schedule for meetings to take place once a week and set thirty-minute meetings to keep the momentum of change she was implementing. She was purposeful and committed to this work and valuing the teacher's time during the day was helpful in this new culture she was trying to establish. PLC meetings prior to winter data collection were intended to set targeted instructional and formative assessment goals. Agendas for these PLC meetings were guided by Hansen's (2015) continuum. Teachers engaged with MAP data for analysis and curriculum discussions. Teachers used fall 2020 MAP data to begin to identify areas of instructional gaps and skill deficits to determine a set of skills to target.

Teachers moved beyond the student growth summary reports for their individual data analysis. A combination of two MAP reports were used to identify skill deficits in each grade level. They used the student profile report to look at the lowest areas for each student per class and recorded the skills associated with each standard to make immediate instructional adjustments. Teachers also used the class breakdown by instructional area report to cross-check groups of students falling into the same skill deficit categories. The information from these reports allowed teachers to make data-driven instructional decisions and implement formative assessments in an attempt to improve in the identified skill areas on the winter and spring test. Teachers were able to follow Hansen's (2015) model for common grade-level skills to develop rubrics for some common deficit areas (Table 2) with this information.

Table 2

Sample Skill Rubric

Identified Deficit Area: Solving Problems, Equations, & Inequalities	
Pre-K	Define the math terms addition, subtraction, plus, equal, and minus sign, and apply it to a basic math problem using numbers 1–10 to find the end result.
Kindergarten	Identify how many more are needed to make 10, when given a number between 1 and 9.
First Grade	Use addition and subtraction within 20 to solve problems of adding to, taking from, and putting together with result unknown.

Teachers discussed instructional approaches and the challenges team members faced when preparing to reteach the largest deficit areas they identified while continuing to teach new material. Formative assessments involved the use of programs like MobyMax for math (MobyMax, 2023) and Reading Mastery for reading (What Works Clearinghouse, 2010) that were already in place but not widely used to support student learning and to offer additional leveled, skill-driven practice opportunities. Common assessments were not used at this early stage in the process. The data the teachers were looking at was splintered across grade levels, but they managed to identify some similar areas of need in each PLC team.

Data Collection & Analysis

The MAP test is a computer-adaptive test that adjusts to each student's responses so that students receive content matched to their estimated achievement level (Soland, 2019; Thum & Hauser, 2018 in Dallavis et al., 2021, p. 8). Conditional growth percentiles (CGP) are an additional component of MAP reporting. Conditional growth percentiles are the student's percentile rank for growth. For example, if a student's CGP is 50, this means that the student's growth was greater than 50 percent of similar students in the NWEA norm group.

The *2020 NWEA/MAP Growth Normative Data Overview* provided benchmarks to compare RIT scores with student/class achievement norms. This instrument, produced by NWEA, allows educators to compare achievement status (growth) to students' performance in the same grade level at a comparable stage of the school year or across two test events within or across school years (NWEA, 2020). Class ***R****ausch Un****IT*** (RIT) scores were compared with the *2020 NWEA/MAP Growth Normative Data* to determine student growth. NWEA defines class RIT scores as "an equal-interval scale, like feet and inches on a ruler, so scores can be added together to calculate accurate class or school averages. RIT is used as a measurement scale developed to simplify the interpretation of test scores" (Marion, 2021). Individual, as well as class, RIT scores were measured against NWEA/MAP-determined student achievement norms.

This study produced two data sets: the first compared individual student RIT scores with the NWEA growth norms for individual growth; the second measured the number of individual students with CGPs at or above the 50th percentile. There were several layers to studying student growth using MAP data in the presentation below. When looking at RIT scores by class, students could show an increase in their individual RIT score to indicate positive growth, but they may still not reach the 50th percentile goal. At the same time, CGPs might indicate maintaining growth at or above the 50th percentile while Individual student RIT scores stay the same or show negative growth.

Winter 2021/Spring 2021 MAP Data Collection

Beginning in the fall of 2019, MAP tests were used across this particular diocese to examine school-wide and diocesan-wide student achievement. Student achievement benchmarking began with a school-wide analysis of winter 2021 student achievement data for approximately 118 students using results from the NWEA MAP tests.

Prior to beginning PLCs, the teachers were asked to complete a survey to gauge their past experiences with PLC meetings and practices. This survey consisted of ten questions in a Google form. Teachers were asked to complete the survey prior to the fall introductory faculty meeting. As PLCs got underway between winter 2021 and spring 2021 MAP tests, the teachers completed a second survey three times following three different meetings in order to help the researcher monitor collaboration and engagement among the PLC teams. This survey was a six-question Google form, and teachers were asked to complete it outside of their meeting in order to have the opportunity to reflect on their responses.

PLC meeting content evolved from training for successful team building and collaboration practices in the fall to the analysis of winter 2021 math and reading data in order to determine skill deficit areas. As soon as testing windows closed and reading and math MAP scores became available, the principal prepared spreadsheets for each teacher/grade level to study in their PLCs. When PLCs convened following the winter math and reading tests, teachers spent time studying student progress on the assessments via their class spreadsheets. PLC work sessions became focused on identifying skill deficits, developing intentional instruction, and discussing formative assessment practices until the spring MAP assessment.

Winter 2021 MAP, RIT and CGP scores were compared with spring 2021 to determine the influence of the vertical PLC model in a small school setting (Table 3).

Grade Level Growth and Individual Student Growth

CGPs were studied for each student per grade level and student RIT scores were compared to NWEA MAP normative data and for math and reading. Individual student growth and CGPs were studied to make immediate instructional modifications. The goal in this small school setting was to have as many students as possible score as close to, or above, the 50th percentile. Additional data collection

Table 3

Winter 2021/Spring 2021 Class-Specific MAP Data for Reading (Fifth Grade) Example Spreadsheet

Student	Fall RIT Score 2020	Winter RIT Score 2021	CGP Percentile	Individual Student Growth	Spring RIT Score 2021	CGP Percentile	Individual Student Growth
1	219	212	57	–7	215	60	3
2	205	205	40	0	211	50	6
3	208	207	45	–1	210	48	3
4	229	227	87	–2	233	92	6
5	196	197	22	1	224	79	27
6	217	213	60	–4	226	83	13
7	205	217	69	12	225	81	8
8	221	223	81	2	216	65	–6
9	204	199	26	–5	210	48	11
10	209	210	52	1	220	71	10
11	222	217	69	–5	220	71	3
12	218	209	50	–9	218	67	9
13	225	223	81	–2	236	94	13

involved an examination of individual student growth comparing RIT scores to MAP normative data per grade level from fall 2020 to winter 2021 and then from winter 2021 to spring 2021.

Teachers studied fall MAP data as part of their training, but it was necessary to present these test scores as one assessment data point as opposed to the only driving force that would invoke mandatory curriculum changes. Portions of PLC training involved learning how to use the overwhelming number of MAP reports that are formidable in number and information. Teachers willingly engaged in all parts of PLC training, and once they learned which reports would be most influential to their understanding of individual and class growth, they were more inclined to focus on what their MAP data was telling them about their students and their instruction and assessment practices. This non-threatening training approach shifted the PLC climate from potential "collaboration lite" (Hansen, 2015) to a shared understanding and ownership of the positive impacts MAP data can have on student performance and growth.

Results

Table 4 reflects *2020 NWEA/MAP Growth Normative Data* determined by NWEA, "which allows educators to compare achievement status (growth) to students' performance in the same grade level" (NWEA, 2020). Figure 3 presents winter and spring math MAP data based on the number of students and the class/grade levels tested. Figure 2 also shows class ***R**ausch Un**IT*** (RIT) scores compared with the *2020 NWEA/MAP Growth Normative Data*. The same students were tested in math for the winter and spring testing cycle.

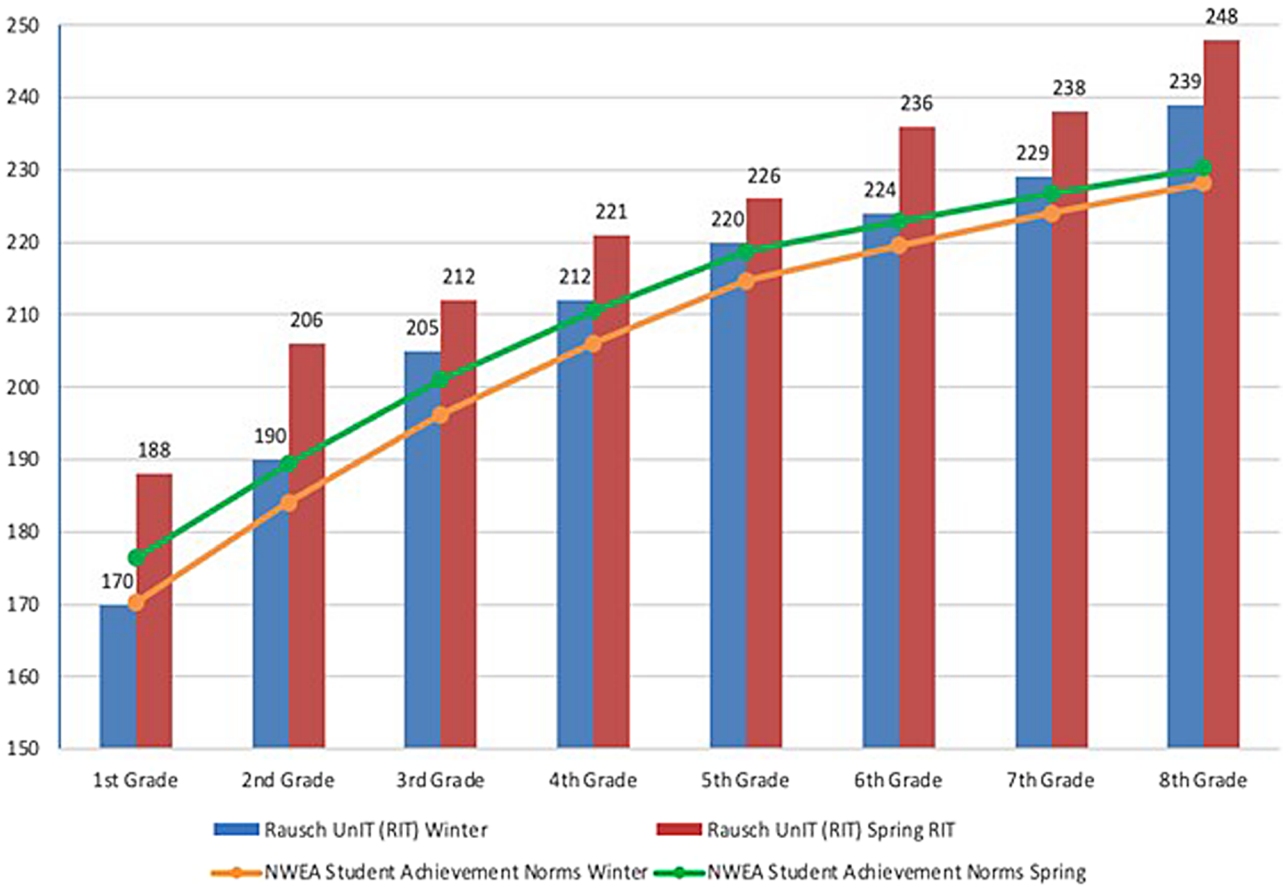
Table 4

NWEA 2020 Student Achievement Norms for Math

Grade	NWEA Growth Normative Data Winter	NWEA Growth Normative Data Spring
1st	170.18	176.4
2nd	184.07	189.42
3rd	196.23	201.08
4th	206.05	210.51
5th	214.7	218.75
6th	219.56	222.88
7th	224.04	226.73
8th	228.12	230.3

Figure 3

MAP Scores: Winter 2021/Spring 2021 Math by RIT and MAP Normative Data



Comparing class ***Rausch UnIT*** *(RIT)* Winter and Spring scores with the *2020 NWEA/MAP Growth Normative Data*, all grade levels showed growth in math. Class RIT scores were consistently above the *Winter NWEA (2020) Student Achievement Norm benchmarks*. First grade students met the 170 benchmark for winter while second through seventh grade students exceeded benchmarks by at least five points. The eighth grade students showed the most growth exceeding the benchmark by eleven points.

All class RIT scores were consistently above the spring NWEA Student Achievement Norm benchmarks. Fifth grade students exceeded the 218 benchmark by eight points while eighth grade students exceeded the benchmark by eighteen points.

Figure 4

MAP Winter 2021/Spring 2021 Math Individual Student Growth by RIT

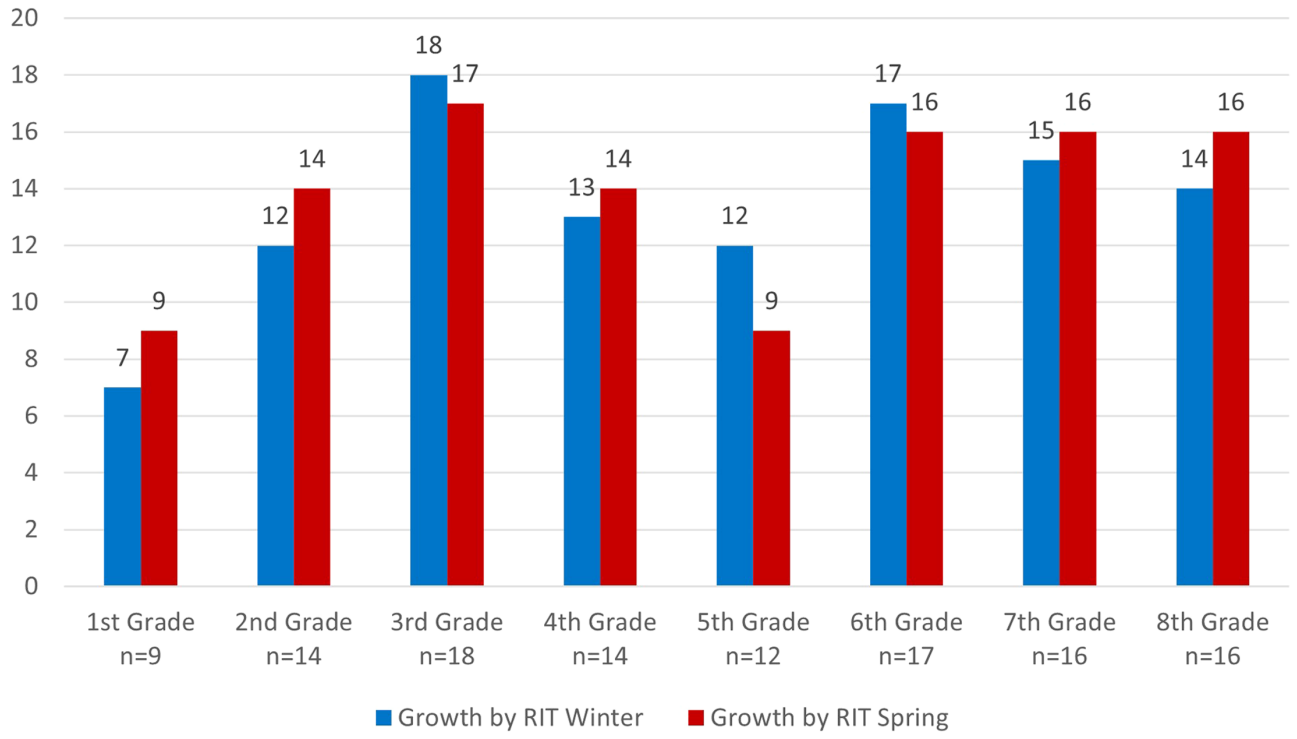


Figure 4 includes the number of students (n) who were tested in each class compared to the number of individual students who showed growth for winter and spring math test sessions. Except for fifth grade, fewer than two students in each class did not show growth in one of the testing sessions. In first grade, nine students were tested. Seven of those students showed growth from fall to winter and then all nine showed growth from winter to spring. The fifth-grade math class showed the least amount of individual student growth. Twelve students were tested and all twelve showed growth from fall to spring, but that number decreased to nine students showing growth from winter to spring.

Table 5

MAP Winter 2021/Spring 2021 Math Scores by CGP

Grade	Students Tested	Students Scoring >50% Winter	Students Scoring >50% Spring
1st	9	8	7
2nd	14	9	9
3rd	18	14	15
4th	14	11	13
5th	12	9	9
6th	17	13	14
7th	16	11	10
8th	16	12	15

Table 5 compares student growth by CGP from winter 2021 to spring 2021 in math. With the exception of first and seventh grade, all grade levels either maintained or exceeded the number of students showing growth at or above the 50th percentile in math.

Table 6 reflects *2020 NWEA/MAP Growth Normative Data* determined by NWEA for reading. Figure 5 presents winter and spring reading MAP data based on the number of students and the class/grade levels tested. Figure 4 also shows class ***R**ausch Un**IT*** (RIT) scores compared with the *2020 NWEA/MAP Growth Normative Data*. The same students were tested in reading for the winter and spring testing cycle.

In Figure 5, class ***R**ausch Un**IT** (RIT)* winter and spring scores were compared to the *2020 NWEA/MAP Growth Normative Data*; all grade levels showed growth for reading. Class RIT scores were consistently above the winter NWEA Student Achievement Norm benchmarks. First grade students slightly exceeded the 165 benchmark with a class RIT score of 166 while fourth

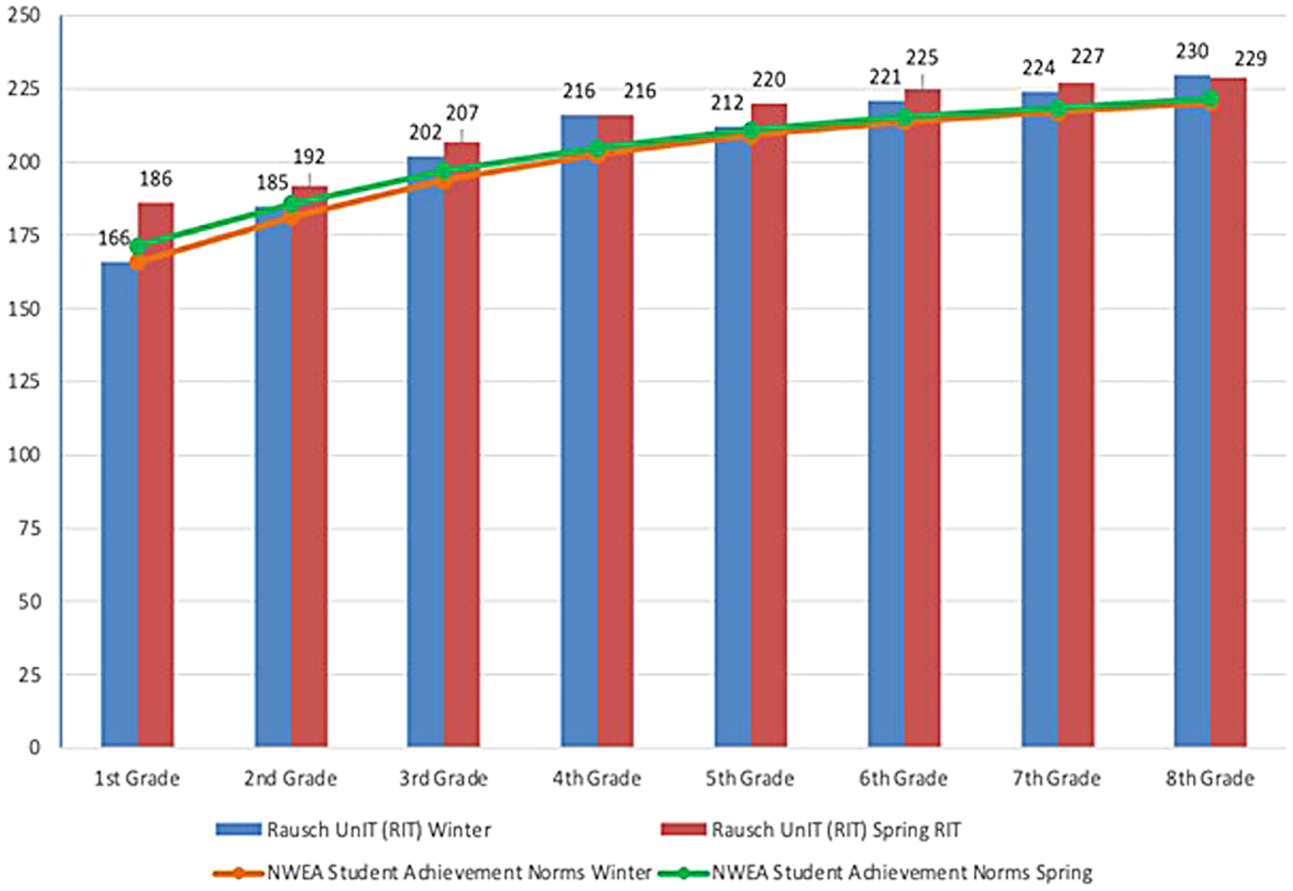
Table 6

NWEA 2020 Student Achievement Norms for Reading

Grade	NWEA Growth Normative Data Winter	NWEA Growth Normative Data Spring
1st	165.85	171.4
2nd	181.2	185.57
3rd	193.9	197.12
4th	202.5	204.83
5th	209.12	210.98
6th	213.81	215.36
7th	217.09	218.36
8th	220.52	221.66

Figure 5

MAP Scores: Winter 2021/Spring 2021 Reading by RIT and MAP Normative Data

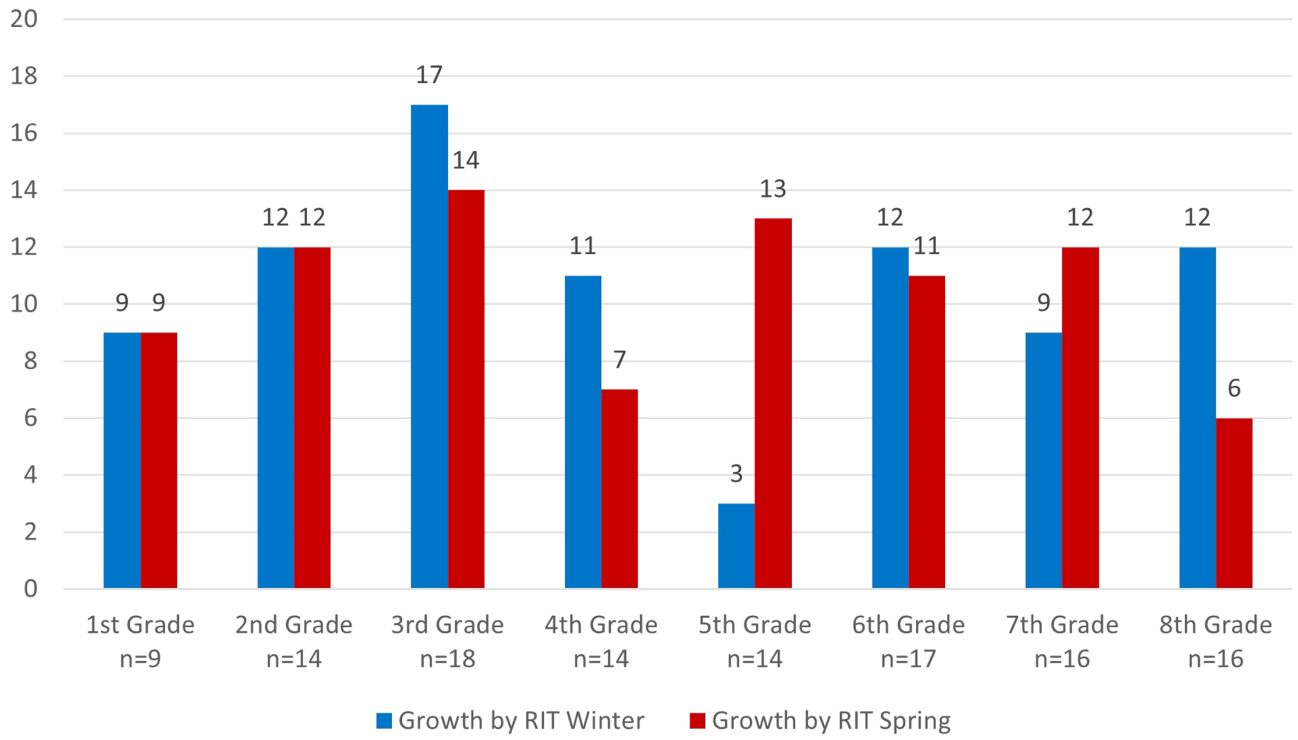


grade students made the most improvement by exceeding the benchmark by fourteen points. Class RIT scores for spring testing also exceeded NWEA Student Achievement Norm benchmarks. First grade students showed the most improvement by exceeding the benchmark by fifteen points. Other grade level students exceeded the benchmark anywhere from seven to ten points.

Figure 6 includes the number of students (n) who were tested in each class compared to the number of individual students who showed growth for winter and spring reading test sessions. Of the total number of students tested in each class, more than half of students showed individual growth in reading in each class; however, reading growth was far less consistent than math growth. First and second grades reflected the same number of students showing growth for both the spring and winter tests. In third grade, eighteen students were tested, and seventeen students showed growth on the winter test. That number dropped from seventeen to fourteen on the spring test showing a decrease in reading scores. Eleven of fourteen students in fourth grade showed growth on the winter test. Only seven showed growth on the spring test. Grades six, seven, and eight were lower than expected regarding the ratio of students tested to those showing improvement. Far fewer

Figure 6

MAP Winter 2021/Spring 2021Reading Individual Student Growth by RIT



students than were tested showed growth in these grades. Fifth grade made the most significant improvement from the winter to spring test. Three of fourteen students showed growth in the winter and that number increased to thirteen of the fourteen students showing growth on the spring test.

Table 7 compares student growth by CGP from winter 2021 to spring 2021 in reading. With the exception of the eighth grade, all grade levels either maintained or exceeded the number of students showing growth at or above the 50th percentile in reading.

Table 7

MAP Winter 2021/Spring 2021 Reading Scores by CGP

Grade	Students Tested	Students Scoring >50% Winter	Students Scoring >50% Spring
1st	9	7	8
2nd	14	9	9
3rd	18	15	15
4th	14	13	14
5th	12	9	11
6th	17	14	16
7th	16	10	14
8th	16	15	13

Two Surveys were administered to the faculty to measure engagement, comfortability, and productivity of PLCs. These surveys asked teachers to answer on a scale of 1–5 with 1 being the lowest rating and 5 being the highest rating. The first survey was given before the faculty began PLCs. Figures 7 and 8 present a summary of the survey results.

Figure 7

Survey 1 Responses: Professional Learning Community Background Information (Summary)

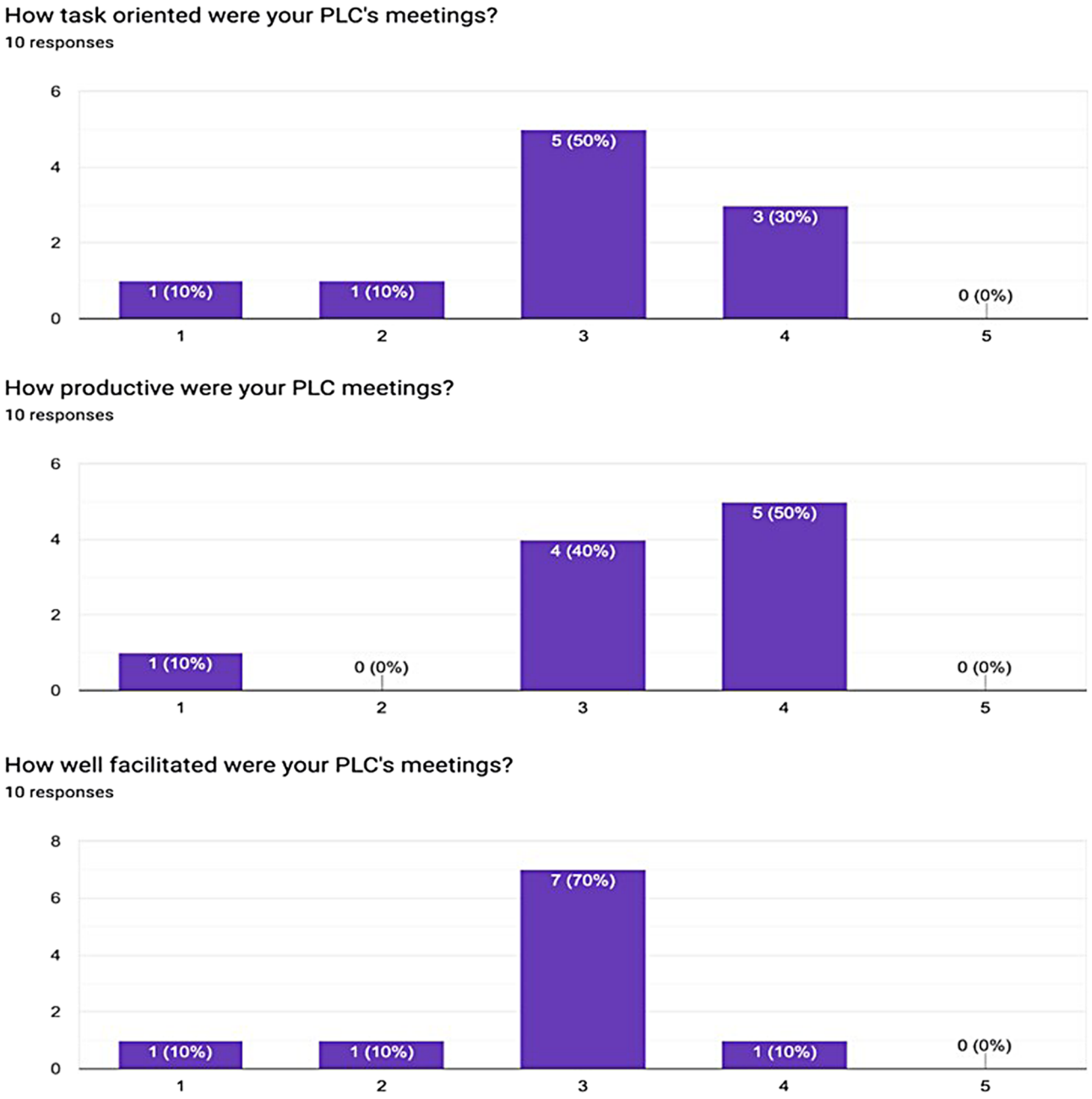
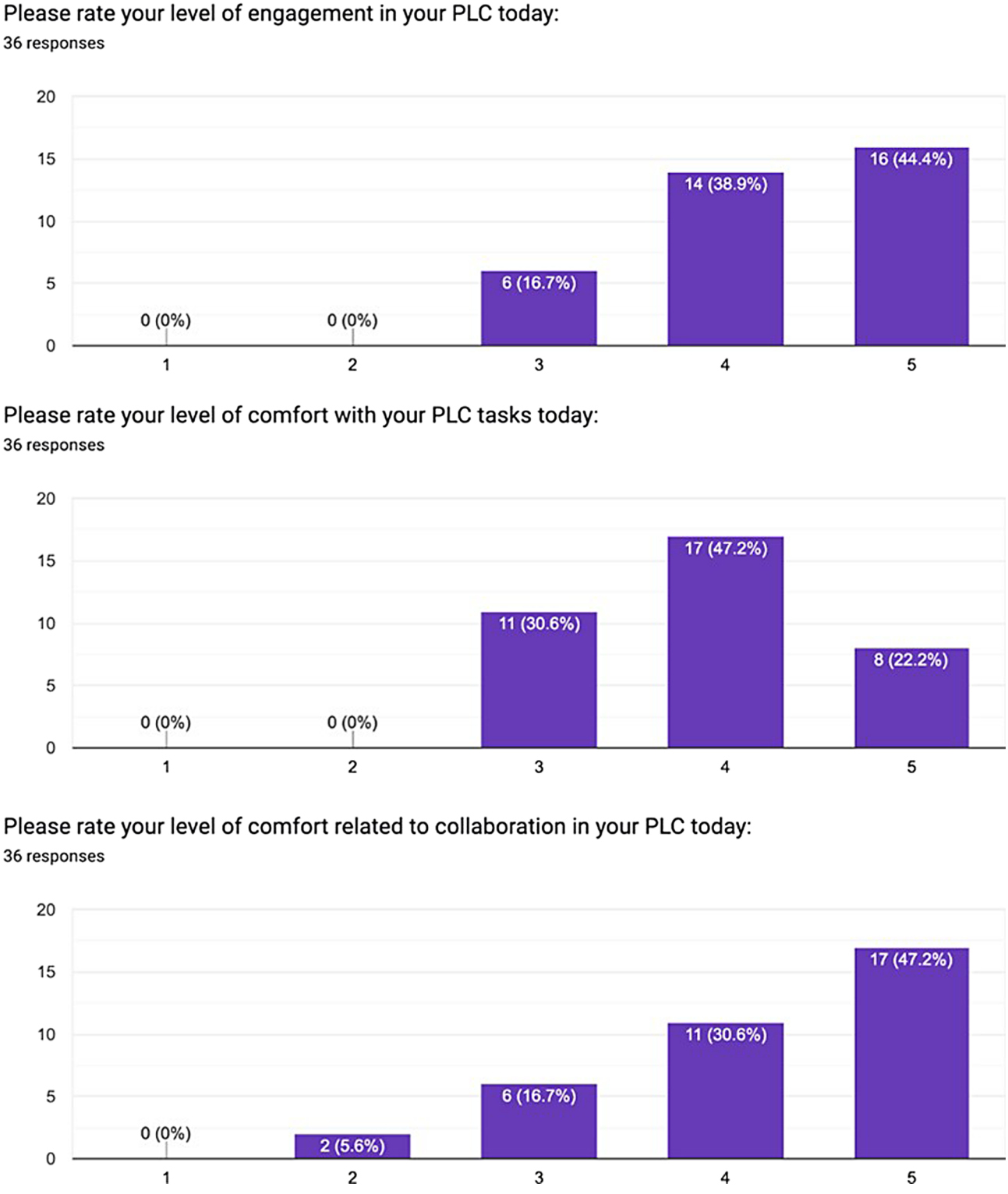


Figure 8

Survey 2 Responses: PLC Individual Reflection (Summary)



This introductory survey included questions about productivity, facilitation, and engagement in past PLCs. Most of the responses indicated some experience with PLCs but in larger school settings. Teachers indicated there was a need for curriculum alignment and instructional improvements that would benefit the students. Responses to the short answer question, *What positive impacts or concerns did you have with your past PLC-related work,* revealed productive experiences around communication with peers and developing student centered instruction. Concerns about format and productivity due to the small school setting arose from the question, *What concerns do you have about our upcoming PLC work?* The responses offered helpful information for the researcher to consider when planning the first few PLC training sessions. Understanding past PLC experiences was pertinent to meeting the teachers where they were and extending their skills for this kind of work.

A second survey was administered three times following different PLC meetings in between winter 2021 and spring 2021 testing as checkpoints for engagement and the perceived value of the PLC meetings.

Responses to the second survey indicated high levels of engagement with 44% reporting being completely engaged and another 38% reported being mostly engaged. Forty-seven percent of teachers reported feeling comfortable with the content related work, peer collaboration, and the clarity of the PLC tasks. The survey included a section for comments and questions, and one teacher commented, "I felt many things were explained and I understand the direction I need to move forward in." Another teacher commented, "The directions are clear, and I am okay with the tasks for the most part."

Discussion

Prior to beginning this work in the fall, the principal compiled MAP data in spreadsheets to share with individual teachers. She quickly recognized, however, that there was no foundation among her faculty to be comfortable in a collaborative, data-driven teaching and learning community where teachers might feel scrutinized by administrators and by peers. The principal took the initiative to learn about PLCs at a local university with two goals in mind: to hone in on a method that would work for her faculty, and to promote data accountability by reducing tension amidst faculty. She recognized that she needed a PLC model that would build a sense of teacher trust, thus providing a safe space for professional vulnerability that inevitably accompanies data sharing practices. The introductory survey responses indicated that while some teachers had experience with PLC work, it was limited and took place in larger school districts on grade level specific teams. The survey results demonstrated teacher openness to participating in vertical PLC teams.

Considering PLC training was taking place between fall and winter tests, PLC work potentially impacted some positive student growth results from winter to spring tests. The principal's accessible

presentation of MAP data for the faculty was instrumental in helping teachers see the relationship between class RIT scores, the *NWEA/MAP Growth Normative Data Overview* and *Conditional Growth Percentiles* per class. Teachers looked at individual student and class growth and analyzed the results together emulating the notion that well-implemented PLCs provide ongoing, job-embedded learning that is active, collaborative, and reflective (Darling-Hammond et al., 2017). Math data from *Student Profile Reports* along with the *Class Breakdown by Instruction Area Reports* were very helpful in driving individual interventions following testing sessions. Technology-based reading and math programs were adopted to supplement and reinforce instruction as well. Teachers used Reading Mastery (What Works Clearinghouse, 2010), MobyMax (MobyMax, 2023), and Kahn Academy (Kahn Academy, 2023) programs to supplement math instruction. Using the reports, they were able to assign students lessons within the programs to reinforce basic math concepts. These particular programs provided students purposeful practice and movement toward skill mastery at their individual levels. The second survey results revealed a positive growth mindset around the PLC structure that supported a collaborative approach to data analysis, planning instruction, and formative assessments.

Shifting the Reading Culture

Reading deficits between the primary grades (first through fourth grades) and the middle grades (sixth through eighth grades) indicated by the winter 2021 MAP data were a concern to the principal. There was a marked discrepancy in MAP reading scores between the primary grades and the middle grades. One potential factor that may account for the discrepancy is the use of the Accelerated Reader Program (AR) in the primary grades. Accelerated Reader is a program that was widely and consistently used in the lower primary grades at this school. Teachers used this program for the sole purpose of increasing the amount of required reading per student in first grade through fourth grade. The principal was decidedly lenient with the middle school teachers about using AR. Middle grade teachers were reluctant to use the AR program and opted to use class novels instead. This resulted in generalized reading instruction with far less engagement.

Following the winter 2021 MAP reporting, the principal reviewed her approach. She decided that changing the reading culture of the entire building was needed. School-wide use of the AR program became a requirement. Middle grade teachers and students were required to meet AR goals between winter and spring MAP tests. The principal instituted a new layer of teacher and student accountability with the AR program. She required all teachers to monitor AR reading goals and to keep them updated in notebooks. She set biweekly checkpoints to monitor student reading and checked regularly with the teachers of students who fell behind. Teachers were responsible for communicating AR expectations with students and parents. The school library was overhauled to update books by Lexile range and Accelerated Reader reading levels. Crucial to

this process, teachers, along with the school librarian, matched each student to reading materials based on conferences with students and guardians. Teachers provided multiple opportunities throughout the school day for students to read and discuss books. The focus on AR tests and the traditional notion of "reading to earn points" very quickly shifted to that of an actively engaged, student-centered reading community. The immediacy on behalf of the principal to implement such a reading culture in a short amount of time combined with a focus on purposeful instruction and assessment were potential factors in the increase in the spring MAP scores.

Evolving and Continuing PLCs

The idea of teacher quality and its importance in improving student learning have made this a time when ideas such as professional knowledge are paramount (Lieberman & Mace, 2010). The implementation of PLCs in this small school setting was central to making informed, intentional, data-driven curriculum changes that positively impacted student achievement to attain both short- and long-term curriculum, instruction, and assessment goals. Immediate, short-term goals centered on the implementation of successful PLCs in order to improve instruction and assessment practices. As the PLCs evolved over the course of the school year, teachers could see the impact of focused, aligned instruction through student performance in each MAP test as indicated in the winter 2021 and spring 2021 testing cycle.

Curriculum alignment work coincided with the grade level PLC work throughout the spring of 2021. In late spring, prior to the spring MAP tests, school-level conversations about vertically aligning math and reading curriculum took place. A mandatory six-hour professional development session on a designated diocesan-wide professional development day was provided for dedicated time using the Kentucky Academic Standards (MAP-developed assessments aligned with state standards) to identify gaps in instructional sequence. Teachers were asked to make curriculum outlines for each quarter of the school year for math and language arts. Each curriculum outline for math included a list of overall skills/concepts that were taught. Curriculum outlines for language arts for each quarter included four components: reading concepts/skills, stories or novels, grammar, and writing pieces. Each teacher transferred their lists to chart paper and the chart paper was hung around the room from Pre-K-8th grade per quarter first for math and then again for reading. This exercise was incredibly valuable for the teachers to see and experience the vertical curriculum alignment. They were able to see immediate gaps in their curriculum and how what they were doing supported (or didn't) their partners in the grades below and above them. For example, the second and third grade teachers had a revelation around the math skill of rounding. The third grade teacher had always assumed her incoming students were adept at rounding when the reality was that the second grade teacher always ran out of time to teach the skill. This was representative of the conversation that took place throughout the session. Teachers were able to notice the skills that were missing as well as the skills that were being overtaught. Personal narrative writing was

one writing piece that the students were experiencing in every grade level while informational and expository writing were not.

Following this professional development session, the principal converted the information on the chart paper to a set of Google slides for every teacher to access as a part of their summer work. Teachers willingly updated their slides for each quarter with a set of standards-based, measurable student outcomes at each grade level as a part of their revisions to curriculum maps to continue the vertical curriculum alignment process for the following school year. The PLC work that began in Fall 2020 quickly resulted in school-wide changes. Kindergarten and first grade curriculums were completely overhauled, and a new math curriculum was adopted for fifth through eighth grades for the following year. The principal also determined the need to invest her personnel resources in a reading interventionist for the following school year.

Ultimately, student achievement gains on MAP testing resulting from PLC work for the 2020/2021 academic year was certainly a celebratory achievement for the school, but the principal and the teachers were committed to continuing their PLC work in the 2021 school year and beyond. With an established PLC foundation, the teachers were anxious to keep working on their student-centered, school-wide improvements. The principal led the charge by creating a schedule that allowed PLC teams to participate in bi-monthly meetings during the school day and monthly after school meetings. There, the teachers continued to focus on data to improve their instruction and assessments. They became well-versed in analyzing specific MAP reports for their classes within NWEA.org like the *Achievement Status and Growth Summary with Quadrant Chart* in conjunction with MAP's *Student Achievement Norms Report*. School-wide reading expectations were in place through Accelerated Reader, a librarian dedicated to monitoring grade level and individual student reading interests and the purchasing and promotion of the books they chose to read, summer reading assignments, and author's visits. The reading interventionist targeted the early primary by using the Brigance Assessment to test kindergarten and first grade students. This assessment resulted in replacing the pre-school curriculum to better prepare the students for kindergarten. Teachers continued the sequencing and adjustment of skill work by quarter in their math and language arts curriculum documents from the March 2021 professional development session to reflect on what the documents said versus what they actually taught.

Study Limitations

There are important limitations that should be taken into account when considering the data in this article. The majority of this research took place during the winter and spring MAP testing windows because the researcher was on sabbatical for the 2021 spring semester. Due to her sabbatical, the researcher was able to dedicate extensive time and support for completing the amount of work that took place in such a compressed amount of time. This dedicated time and

presence set an intense pace to implement PLCs and offer consistent support for the principal and faculty. Once the researcher's sabbatical ended, the PLC work slowed down considerably, but it is ongoing. Another study limitation revolved around survey data. The administration of a third survey as another data point would have been helpful to look for a correlation between the PLC structure and the instructional changes, assessment data, and interventions that grew from the PLCs. Additional survey data might impact PLC work moving forward. A final limitation of this study concerned inter-rater reliability training for the teachers. Inter-rater reliability training based on Hansen's continuum document (2015) was not part of the adopted PLC model. Teaches informally collaborated on student progress to develop mastery skill rubrics and to discuss formative assessment measures in PLCs.

Conclusion

PLC work in this school is just getting underway. Future PLC work involves developing a set of mastery skills for math and reading per grade level using the existing curriculum documents, the development of a vertical literacy continuum, and creating a set of eighth grade math and reading readiness standards for the local diocesan feeder high school. The elementary principal plans to work with the diocesan high school principal of her feeder school to ensure eighth grade math and reading readiness using longitudinal MAP data for each student to see how it influences ACT data as the students progress through their first year of high school. A larger collaborative plan is to create a PLC consisting of eighth and ninth grade math and reading teachers following DuFour's model of PLCs "with a focus on learning, collaborative teams, collective inquiry, and continuous improvement" in order to encompass the larger organization the DuFours (2004) refer to at the distinct level (Solution Tree, 2023).

Many factors contributed to continued student growth in math and reading in this small school setting. The implementation of the PLCs and the structure they require to be successful were catalysts for such comprehensive improvements in a short period of time. The principal and faculty remain committed to ongoing PLCs and the guiding questions: What do we expect students to learn? How will we know if students are learning? How will we respond when some students are not learning? How will we respond when students are learning (DuFour et al., 2008)? Maintaining fidelity to NSBECES Standard 7 (An excellent Catholic school has a clearly articulated, rigorous curriculum aligned with relevant standards, 21st century skills and Gospel values, implemented through effective instruction) and Standard 8 (An excellent Catholic school uses school-wide assessment methods and practices to document student learning and program effectiveness, to make student performances transparent, and to inform the continuous review of curriculum and the improvement of instructional practices) is central to the school's mission and the principal's vision for success (NCEA, 2023).

Using reading and math MAP reports of individual student growth, teachers determined how well they were teaching major concepts. They actively engaged in supporting and learning about ways to improve their teaching craft, to inform each other about which students needed their learning extended, and to inform students about their position in the learning progression (Hansen, 2015). By implementing Hansen's (2015) model for developing PLCs, teachers were able to maintain fidelity to the assessment practices that define successful Professional Learning Communities and the positive impact they have on student achievement.

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