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Program evaluation of a high school science professional learning community

Rebecca McLelland-Crawley
Walden University

Walden University

COLLEGE OF EDUCATION

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Rebecca McLelland-Crawley

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Chief Academic Officer

Eric Riedel, Ph.D.

Walden University
2014

Abstract

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by

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MS, Walden University, 2004

BA, Kean College, 1997

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Teacher Leadership

Walden University

April 2014

Abstract

Teachers may benefit more from a professional learning community (PLC) than from professional development initiatives presented in single day workshops. The purpose of this program evaluation study was to identify characteristics of an effective PLC and to determine how the members of the PLC have benefitted from the program. Fullan's educational change theory provided the framework for the study, which refers to learning experiences of teachers when collaborating with peers. The sample consisted of 9 biology teachers during the 2012-2013 school year. Data were collected through online surveys and face-to-face interviews regarding effective PLCs. The online survey questions were asked to identify the characteristics of PLCs. Interviews were conducted to examine how biology teachers benefited from PLCs. Survey data were analyzed for descriptive statistics. Interview transcripts were analyzed using thematic analysis for emergent themes. According to study findings, PLCs are used for shared teaching vision and practices. Sustained use of PLCs in schools could help create supportive professional learning environments for teachers to improve their teaching practices through purposeful collaboration.

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Dedication

I dedicate this thesis to my beloved family. Their unyielding support and unconditional love has provided me with the inspiration to always push myself to new heights as a learner. I am grateful to my guardian angel, Marion Helen Stachowski, for pointing my compass north.

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To every person who has helped me on my journey, I send my heartfelt appreciation. There are several people, whom without their help, this doctoral study might not have been written. I am grateful to Dr. Peter Kiriakidis, URR, who has challenged and supported me each step of this doctoral study journey. I was fortunate to have been guided with the tremendous and gracious assistance of my doctoral chairwoman, Dr. Joanne Hinrichs and my doctoral committee member, Dr. Christopher Godat. I am especially appreciative to all of the participants who allowed me to capture their perceptions of their learning community to help them continue to grow professionally.

I thank my dear friend Stacy, who encouraged me and never allowed me to quit after each life event. I completely acknowledge that I am a better person after learning about sacrifice and unconditional love from my husband, Steven, who supported my personal and academic journey. I thank my sister, mother and father for their continued encouragement and love. Finally, I thank my beloved children, Kathryn and Aidan, for inspiring me to want to make the world a better place for students everywhere.

Table of Contents

List of Tables

List of Figures

Section 1: Introduction to the Study

Introduction

Current trends in education reform are focused on the need for improved professional development (PD) for all teachers. One such trend in PD is a professional learning community (PLC), which consists of educators working together to improve students' success (Dufour, 2007). Many schools try different initiatives for PD such as instituting PLCs. Scholars support PLCs as systems for improving teaching practices (Dufour, 2007; Schmoker, 2006). Schmoker (2006) stated, "PLCs are the surest, fastest path to instructional improvement" (p. 105). William (2007) stated, "Teacher learning communities appear to be the most effective, practical method for changing day-to-day classroom practice" (p. 39). PLC programs should be evaluated to determine if the intended outcomes are being met and to make sure they are operating as effective PLCs. Failure to evaluate PLCs, like any professional development initiative, can result in ineffective practices that may decrease student success (Guskey, 2002; Muijs & Lindsay, 2008). To address this problem on a local level, I evaluated a PLC used by biology teachers in a suburban high school.

Substantial PD is important in the teaching profession (Gaudelli, 2003; Ingvarson, Meiers, & Beavis, 2005). PD is used to create opportunities for increased collegial networks and sharing of ideas that often translate into increased student performance. Single day workshops rarely provide teachers with the sustained learning necessary to make a lasting impact on their classrooms. Leading experts advocate professional learning for schools (Dufour, 2004; Louis, 2006; Semadeni, 2010). National and state

standards include PD through PLCs. School districts are implementing PLCs to improve professional learning; however, education stakeholders often do not monitor and evaluate their effectiveness. Grade-level teams, committees, and social groups are incorrectly identified as PLCs (Dufour, 2004). Because many schools use the term PLC to define a team of teachers, it becomes necessary for school leaders to evaluate these teams to determine if they are functioning under the auspices of a PLC and share standard characteristics of PLCs – shared vision, a focus on student learning, collaborative culture, shared practice, and supportive leadership (DuFour, 2004; DuFour, DuFour, Eaker, & Many, 2010; Hord, 2007; Reichstetter, 2006). For the purpose of this research, according to Hord (2007), PLCs are collaborative educator teams who are primarily dedicated to improving student performance and teacher practices.

Problem Statement

PD opportunities are offered to teachers at the suburban high school, which was the research site. District-wide PD opportunities are focused on lesson planning, writing common assessments, teacher evaluation expectations, conducting instructional rounds, and aligning and updating curricula to reflect the common core standards; however, PD sessions vary from school to school (Appendix B). In contrast to short-term training sessions, the biology team was meeting weekly to plan common assessments and activities and discuss student work. I investigated the local problem in one school district where the larger issue of PD through PLCs was explored.

Four years after a top-down initiative spurred the creation of PLCs within the high schools in order to create common assessments, one team, the biology teachers, started

using PLCs. As of September 2012, these biology teachers met during a common planning period and afterschool to write and evaluate common assessments, design shared lessons, and reflect on student learning. While many other teaching teams exist within the high school science department, the biology PLC (a) exhibits more of the shared characteristics of PLCs, (b) has documented student success according to state standardized test scores, and (c) is the only science team with a high-stakes exam for an entry-level course. Biology teachers have been teaching general education, special education, and limited-English proficiency students to develop the proficiency in biology in order to pass New Jersey Biology Competency Test (NJBCT). A support system for these teachers has been developed within their PLC to help design more effective strategies to assist learners. These teachers acquired characteristics of a PLC as a result of frequent meetings focused on student achievement; however, the PLC had not been evaluated to determine the extent of their professional growth. The common characteristics of highly effective PLCs have been identified as (a) a focus on learning and teaching, (b) shared values and vision, (c) collaborative culture, (d) supportive and shared leadership, and (e) reflective professional inquiry (Clauset, Lick, & Murphy, 2008; Dufour, 2006; Nelson, 2009; Stoll, Bolam, McMahon, Wallace, & Thomas, 2006; Yoon, Duncan, Lee, Scarloss, & Shapley, 2007). A formal evaluation of the PLC provided findings on its efficacy as a model for professional learning.

During informal discussions with members of the PLC, many have expressed concerns regarding a lack of consistent training on writing and scoring assessment questions and transfer tasks for all biology teachers, as well as a lack of time for common

planning. Due to other school obligations, these teachers are taking time away from their actual meeting time and there is a general lack of support from administration attending meetings and listening to the concerns of the PLC. An informal conversation with the team has provided insight into why they meet so consistently. Many members have felt that they are able to call on one another for ideas and support, and have established their own sense of distributed leadership among the team. A new approach to the biology curriculum has emerged from within the group to reflect a themed, problem-based curriculum. Many members of the team have expressed a vested interest in their efforts and want to improve student success in biology. An evaluation of the PLC team had to be examined in order to provide school and district and administrators with awareness of how PLCs can improve teaching practices.

Rationale

Administrators monitor school PD programs in order to ensure goals are achieved. According to Rooney (2007), "Expertise of teachers depends on the quality of professional development" (p. 87). An evaluation of the biology PLC provided insight into the strengths and weaknesses of the current program. All teachers are considered highly qualified and possess either bachelors or master's degrees in their content area. However, Wenglinsky and Silverstein (2006) reported, "Even teachers who are highly prepared to teach their subjects need ongoing professional development that enables them to refine their skills" (p. 25). Moreover, educational professionals are becoming aware that single day professional workshops are ineffective in producing lasting changes in

teachers (Snow-Renner & Lauer, 2005). Teacher collaboration is an effective means of PD, which is impacting teacher and student performance (Dufour, 2006; Honawar, 2008). The research site school and district administrators needed research-based findings to evaluate teacher PLC programs of collaborative efforts to ensure they are reaching their district goals.

Evidence of the Problem at the Local Level

Reform educators focused on more collaborative learning experiences for staff members at the research site. PLCs foster relationships among colleagues and focus on the issues directly impacting student learning in schools (Dufour et al., 2010). PD and PLC initiatives have been instituted to support teachers to improve test scores (Appendix A). Poor student performance within the subgroups of limited English proficient (LEP) and special education (SE) on the High School Proficiency Assessment (HSPA) and New Jersey Biology Competency Test (NJBCT) were issues at the research site. School administrators needed research-based findings to increase teacher consistency on district curriculum through common assessments (HS professional development chair, personal communication, August 15, 2012). Furthermore, an external program review of the various departments in 2008 also made recommendations for improving PD.

Within the regional school district, the high school teaching staff is divided between two schools. This scheduling option tends to eliminate collaborative relationships that could occur among staff members during the day. The practice of embedding a common planning period to facilitate PLCs is not common practice at either high school. In 2012, I was hired by the school district to take on the role of the district

science supervisor. In this position, I primarily supervised the implementation of district-wide curriculum. I provided feedback to central administration on PLCs. The background information I received from each of the science teams was that teachers meet bi-monthly after school hours to plan out common activities and to construct common assessments. In the 2011-2012 school year, one group, the biology team, emerged as a potential PLC with a shared vision of improving student success on the NJBCT, maintained a collaborative culture, and had support from school leadership. Several members of this team also frequently accepted student teachers from the local universities and they participated in all of the PLC activities. I evaluated their progress to learn from their experiences because they were the one group within my department implementing a different mode of PD, seeing gains in student achievement, and making greater gains in reaching all students.

State-mandated assessments in mathematics, language arts, and biology serve to underscore the significance of establishing and monitoring effective professional learning experiences of teachers. According to the New Jersey Department of Education (NJDOE; 2009), in order to graduate from a New Jersey public high school, all students must obtain a proficient score on the HSPA based on state legislation (18A:7C-6.2). The HSPA was instituted in 2003 and is administered each March to all first-time 11th graders. Students who do not achieve proficiency on the HSPA must take the test again in October as 12th graders. If students do not pass in October, then they must then take part in the NJDOE (2009) Alternative High School Assessment (ASHA) in order to qualify for graduation. Both the HSPA and ASHA are used to identify the student's grasp of

mathematical and language arts literacy. The assessments are based on the New Jersey Core Curriculum Content Standards. School districts and department PLCs can use the results of the assessments to identify the strengths and weaknesses of their curricula.

No Child Left Behind Act (2001) established a state-required mathematics and language arts, and science assessment in each of the three grade spans 3-5, 6-9 and 10-12 by 2007 and requires all students to be proficient by 2014. To meet the required science assessment component, the state of New Jersey also has in place a science component on the New Jersey Assessment of Skills and Knowledge (NJASK) in Grades 4 and 8 and the biology course exam, which in 2010 was referred to as the Biology End of Course Assessment (Bio EOC). In 2011 and beyond, the test has been referred to as the New Jersey Biology Competency Test, which is the high school level of NCLB requirement. All high school students are required in New Jersey to pass a biology course before they can graduate. Although the biology assessment is not slated to count as a graduation requirement, the results are public knowledge and may be tied to individual teachers and are published via the state website. In a merit pay climate, teachers who have poor student results on such a high-stakes test may face professional repercussions. School district administrators are looking for ways to improve PD (Hirsh, 2012) and may evaluate the use of PLCs to increase student success through increased teacher collaboration.

The setting for this study was a suburban high school serving 3,230 students in a school district of nearly 10,000 students. There were 10 schools throughout the district, including four elementary, two intermediate, two middle, and two high schools.

According to the state report cards for the two suburban high schools within the school district (NJDOE, 2011), only 60.4% at High School 1 (HS1) and 64.4% at High School 2 (HS2) spoke English as the primary language at home. The other primary languages spoken at home were Chinese, Spanish, and Hindi. The percentage of LEP students at HS1 was 2.5% and HS2 were 0.1%. The percentage of classified students with an individualized education plan (IEP) at HS1 was 10.2% and at HS2 was 13.3%. All students are required to take the HSPA or an alternative assessment to graduate high school. All first-year biology students are also required to take the New Jersey Biology Competency Exam in May each year. As such, many classified students must take the HSPA, but may not be required to pass the exam due to the severity of their learning disability. There are considerable challenge for many teachers in planning differentiated and appropriate lessons for classrooms with mixed learning levels. The mobility rate for the 2010-2011 school year was 3.0%.

The suburban school district has a long tradition of academic excellence and ethnic diversity. However, while large numbers of students in the general population are performing at the proficient level, there are disparities when looking at the breakdown of subgroups. Students who are classified with a learning disability or as limited English proficient are scoring very poorly as indicated (Tables 1-6).

Table 1
2010 Suburban School District state math testing results (NJDOE, 2011)

HSPA Mathematics	Partial Proficient	Proficient	Advanced Proficient
General Population	2.1%	29.9%	68%

Students with Disabilities	34.1%	47.7%	18.2%
Limited English Proficient Students	61.5%	30.8%	7.7%

Table 2

2010 Suburban School District state language arts testing results (NJDOE, 2011)

HSPA Language Arts	Partial Proficient	Proficient	Advanced Proficient
General Population	0.1%	44.3%	55.5%
Students with Disabilities	17%	72.7%	10.2%
Limited English Proficient Students	61.5%	38.5%	0%

Table 3

2010 Suburban School District state biology test results (NJDOE, 2011)

EOC Biology	Partial Proficient	Proficient	Advanced Proficient
General Population	11.9%	42.5%	42.9%
Students with Disabilities	45.8%	43.9%	10.3%
Limited English Proficient Students	42.9%	42.9%	14.2%

Table 4

2011 Suburban School District state math testing results (NJDOE, 2012)

HSPA Mathematics	Partial Proficient	Proficient	Advanced Proficient
General Population	2.4%	27.7%	70.0%
Students with Disabilities	28.1%	51.7%	20.2%
Limited English Proficient Students	15.4%	30.8%	53.3%

Table 5

2011 Suburban School District state testing language arts results (NJDOE, 2012)

HSPA Language Arts	Partial Proficient	Proficient	Advanced Proficient
General Population	0.7%	41.5%	57.8%
Students with Disabilities	5.7%	77.0%	17.2%
Limited English Proficient Students	7.7%	92.3%	0.0%

Table 6

2011 Suburban School District state biology test results (NJDOE, 2012)

NJBCT	Partial Proficient	Proficient	Advanced Proficient
General Population	5.8%	49.4%	44.9%
Students with	41.7%	48.1%	10.2%

Disabilities			
Limited English Proficient Students	23.8%	52.4%	23.8%

Unique challenges within the school district serve as a catalyst for effective PD geared at helping all students succeed. PD at the high school level is determined based on both on the district needs and high school needs. As a result, all departments receive similar PD workshops (Appendix A: HS PD offerings 2011-2012). All staff members have been given several workshops or online webinars aligned with district initiatives or other mandated trainings such as lesson planning software, antibullying strategies, sexual harassment, and common assessments. The school and district leadership committee develops PD workshops based on those identified areas for the school to assist with student success; however, these PDs are not content specific (PD Committee Chair 2008-2010, personal communication, September 25, 2012). Content PD is not an area identified by the school leadership committee to increase student success. The same workshops have been given to all departments, without any science content. High school science teachers are given science safety workshops as required by state law, but are not provided with in-house PD to increase content or pedagogy knowledge.

In 2009, the science department underwent an external program review, which yielded data on teacher, student, and parent perceptions of the science program and recommendations were made on how to improve the program. In a teacher survey sent to the staff members in November of 2009 as part of the external program review, teachers were asked to rate their district on the offerings related to science (Moody & van der

Veen, 2009). A total of 96 teachers in the district took part in the survey. For the prompt, "The district offers ample opportunities for science-related professional development," 41% of respondents stated *disagree* and 11% of respondents stated *strongly disagree*. When asked to respond to, "I seek out and participate in high quality professional development on my own time," 20% *strongly agreed*, 36% *agreed*, 38% *disagreed*, and 4% *strongly disagreed*. The survey data indicated science teachers are dissatisfied with the opportunities for science related PD offered within the district and were seeking external PD to supplement their learning.

Based on the data collected from the external program review, a shift in the PD offerings was necessary. According to Moody and van der Veen (2009), PLCs should develop best practices in science education. A PLC is a group of teachers who identifies a common interest or concern, meets to identify goals, conducts research, and designs a plan to achieve results. The district implemented common assessments where teams of teachers within the science discipline met frequently after school hours, during department meetings, and during common preparatory periods to plan common assessments. Many of these science teams have not, however, established goals or used the results of the common assessments to direct instruction. Furthermore, these teachers have not used team-established norms. The main purpose of the groups was to develop common assessments and common activities. In September of 2012, I was asked as the new science supervisor of the school district to report on the status of the recommendations of the external review and report my findings to the administrative team. While several teams were working toward a beginning stage of PLC development,

there was one team of biology teachers who exhibited more of the characteristics of a true PLC by comparison. An evaluation of their team could provide the department with feedback on the establishment of their PLC and serve as a model for the rest of the teams within my department. In addition, as part of the program review recommendations, the district administration agreed to institute and monitor PLCs in the science department. This evaluation was conducted to help the department comply with those recommendations by assessing the group in its current state and providing the group with recommendations on how to improve.

Each of the science discipline teams (chemistry, physics, biology, anatomy and physiology, forensics, and environmental science) were instructed by the science supervisor to meet during their common planning period and, in lieu of a monthly department meeting, use their PLC meetings to write common activities and common assessments. Information was distributed to the staff members on PLCs and they were given ideas on what the teams could do within the PLC in order to produce common assessments. The teams were established as common subject teams, although they were encouraged to develop into PLCs with little to no instruction on how to do so. The science supervisor met with each team in the beginning of the year; however, the visitations decreased as the year progressed. With much less accountability, the teams stopped meeting on a regular basis. During the 2009-2010, 2010-2011, and 2011-2012 school years, the common planning teams did not function as PLCs. Many of the different science teams did meet. When initial common assessments were created, many groups felt the purpose of the team collaboration had been achieved.

In the 2011-2012 academic year, the group transformed from a common planning team and developed more of the characteristics of a PLC under the direction of one of the team members. After teaching biology for a number of years in the high school, she noticed that her students were not engaged by the biology curriculum as it was written. Having sought out her own professional learning from external sources, she became interested in project-based learning opportunities for her students and began integrating them into her classroom. She approached her science supervisor about rewriting the biology curriculum to be problem-based. In the summer of 2012, two biology teachers and one special education teacher met to plan the architecture of the new curriculum for the regular biology curriculum. The 2012-2013 school year served as a pilot year to collect data on how student achievement and motivation were impacted by the changes compared to classes of students taught via the traditional curriculum. This team was also significant because the biology teachers worked with the students who take the Biology Competency Exam at the end of the school year and because they were the one team who continuously met during the school day and after school to design and evaluate common activities and assessments. While not all of the teachers could gather during the school day, many teachers were able to meet during an unintentional common period to plan out common activities. This common planning period shared by some teachers in the PLC was not typically placed in the schedule.

The goals of the biology team expressed by teachers at their meetings were to improve student achievement on the NJBCT; increase student mastery of biology content and 21st century skills like effective communication, collaboration, and self-directedness;

and to increase teacher collaboration. Many of biology teachers met 5 days a week and have had a consistent schedule. Teachers shared student work samples and discussed the problems standing in the way of student success. The student teachers in the group were encouraged to take an active role in the PLC and sit alongside their cooperating teachers to plan and discuss teaching strategies. However, instead of focusing on problems, they researched solutions. For example, in order to improve student achievement on transfer tasks, the team designed multiple common project based tasks and rubrics aligned to the New Jersey Core Content Standards. These teachers also brought in experts from the technology department and special education department to assist in planning common assessments and assignments.

The biology team changed from a common team into a PLC during the 2012-2013 school year with an effort to design and implement common activities, tests, and rubrics in order for all students to receive the same preparation for the NJBCT. In conversations with the team members, many were concerned over the disparity between the scores for the general population as compared to the SE students. Moreover, they were concerned that some teachers appeared to be more successful with meeting the needs of the SE students than the others. Team members have voiced a desire to plan common lessons with a greater emphasis on meeting the needs of the SE students through differentiation of instruction. According to Semadeni (2010), "The increasing diversity of the student population in the United States is bringing increasingly complex teaching challenges; all teachers will need to master a large repertoire of instructional strategies to succeed with

all students" (p. 69). Biology teachers worked collaboratively within their team and with all stakeholders in order to meet the needs of their diverse classrooms.

The biology team has begun a paradigm shift from the traditional PD to professional learning through job-embedded, collaborative, data-driven, reflective practice. Teachers should take control of their professional learning activities and not rely on school districts to provide them with the tools for reflective practice (Brookfield, 2008; Cranton, 2006; Day, 2000; Mezirow & Taylor, 2009). A positive impact on student achievement is likely to occur based on the literature regarding sustained PD and PLCs (Dufour, 2006; Nelson, 2009; Yoon et al., 2007). Implementing effective PLCs within a school is not an effortless task. Effective PLCs share common characteristics identified as (a) a focus on learning and teaching, (b) shared values and vision, (c) collaborative culture, (d) supportive and shared leadership, and (e) reflective professional inquiry (Clauset et al., 2008; Dufour, 2006; Nelson, 2009; Stoll et al., 2006; Yoon et al., 2007). I evaluated one science team for the presence of the qualities of a PLC.

Evidence of the Problem in the Larger Educational Context

Administrators and policymakers need effective ways to increase graduation rates and student achievement through improved teachers' practices. One million U.S. high school students do not graduate from high school on time (Alliance for Excellent Education, 2013). According to the National Center for Education Statistics, on average only 75% of high school students earn their diplomas (as cited in Aud et al., 2012, p. 80). The United States ranks 18th out of 24 comparable, developed countries for high school

graduation rate (The Organization for Economic Co-Operation and Development [OECD], 2008). U.S. competitors, such as Denmark, Finland, Germany, and Japan, have increased their high school and college graduation rates as part of their efforts to build a stronger workforce in order to compete in a global economy, whereas "America has almost stood still while the global talent pool has grown across the world" (Asia Society, 2008, p. 2). Young adults in Denmark, Finland, Germany, and Japan are more likely to have completed secondary and tertiary school than their U.S. counterparts and are more prepared for jobs requiring this level of education. Wagner (2006) contended teacher PD must change in order to prepare U.S. students for the demands of a global economy.

A change in the U.S. education system is needed in order to ensure a sustainable U.S. economy is built on a skilled workforce (Alliance for Excellent Education, 2013). Many U.S. students are not prepared for the demands of a global market, where the best and brightest excel, and current instructional strategies are not likely to impact this statistic (Jackson, 2008). School leaders must find ways to increase teacher effectiveness and support research-based initiatives aimed at improving student success. After NCLB (2002) was enacted, individual states found themselves responsible for preparing their students for the demands of the 21st century with skills in mathematics, language arts, and science literacy, and often without the funding for widespread school reform (US Department of Education, 2001). In 2009, the federal government responded to the growing sense of urgency for school reform with the Race to the Top initiative where states apply for federal funds to "support coherent, compelling, and comprehensive education reform" and use this funding to widespread reform in order to secure U.S.

standing in the global marketplace (US Department of Education, 2013, para. 4). In many instances, school reform can occur within the organization by harnessing the expertise of the individual teachers.

Teachers must engage in PLCs in order to best prepare their students for a competitive global workforce and economy. PLCs offer one approach to improve teacher practice and student learning (Dufour, 2007; Louis, 2006; Semadeni, 2010). According to Wei, Andree, and Darling-Hammond (2009), countries that perform well on international assessments place a greater emphasis on the job-embedded PD of PLCs, teacher leadership, and reflection. Lifelong learning is necessary for U.S. educators to raise the bar for their students, and holding teachers to high and rigorous standards for professional development is one way to ensure U.S. students are taught by teachers who engage in rigorous professional development. PLCs offer job-embedded, reflective learning among staff members with shared leadership roles.

Definitions of Terms

Adequate yearly progress (AYP): A student accountability measurement for schools, districts, and individual states which was established under Title I of the No Child Left Behind (NCLB; 2001) act (US Department of Education, 2001) where students must demonstrate proficiency in language arts and mathematics. According to NCLB (2002), AYP applies the same high standards of academic achievement to all public elementary school and secondary school students in the State (Part A, Subpart 1, Sec. 1111, 2[c]).

Common formative assessment: An assessment typically created collaboratively

by a team of teachers responsible for the same grade level or course. Common formative

assessments are used frequently throughout the year to identify (a) individual students

who need additional time and support for learning, (b) the teaching strategies most

effective in helping students acquire the intended knowledge and skills, (c) curriculum

concerns, and (d) improvement goals for individual teachers and the team (Dufour et al.,

2010)

Professional learning communities (PLCs): Collaborative educator teams who are

primarily dedicated to improving student performance and teacher practice. While PLCs

differ on their individual goals within schools, they share common characteristics in the

literature: (a) a focus on learning and teaching, (b) collaborative culture, (c) reflective

professional inquiry, (d) shared values and vision, and (e) supportive and shared

leadership (Clauset et al., 2008; Dufour, 2006; Nelson, 2009; Stoll et al., 2006; Yoon et

al., 2007)

SMART goals: Goals that are strategic and specific, measurable, attainable,

results-oriented, and time bound (O'Neill & Conzemius, 2005)**.**

Significance

Teacher collaboration is an effective means of PD and can make a lasting impact

on student learning and teacher performance (Dufour, 2006; Honowar, 2008). According

to the biology teachers, meeting on a regular basis and developing common assessments,

activities, and a different curriculum was a district initiative (Biology team lead, personal

communication, September 30, 2012). Increased leadership among the staff members and

individual accountability pulled the team together to ensure student success on the statewide science assessment and for the coconstruction of a new project-based curriculum. This team of teachers is the first at the high school level to embark on the implementation of a full PLC and offers much to be examined and learned from by the other school departments (HS PD Chair, 2007-2010 personal communication). The problems faced with instituting and maintaining a PLC for all departments can be overcome by an analysis of an existing program. I evaluated the existing program in order to assist the team with feedback on how to make gains in student learning within their PLC. Furthermore, all of the stakeholders, such as the teachers, administrators, and students, could benefit from the findings of the evaluation of the biology PLC. The significance of the findings could assist other teachers and administrators in planning and executing future PLCs within the school district. As a result, students will benefit from increased teacher collaboration focused on student achievement.

Guiding/Research Question

PLCs may offer teachers a way to see gains in professional learning and student achievement (Dufour, 2007). PLC applies to collaborative teams. I sought to determine if the biology team is (a) a PLC, (b) is meeting its intended goals, and (c) who is benefiting from the program. As such, the central research questions guiding this project were as follows:

1. What characteristics of an effective professional learning community are evident within the Biology PLC?

2.   How did PLC members benefit professionally from being a part of the learning team?

3.   What types of products has the team created to benefit students?

I analyzed the data and provided recommendations for future PD and the use of PLCs. The findings of this program evaluation contribute to the larger body of knowledge about PD through PLCs for high school biology teachers. This project can also impact the school district by acting as a model for job-embedded PD within the suburban high school.

Review of the Literature

This PLC program evaluation was based on the documented evidence that PLCs are one professional tool teachers can use to increase both classroom performance and student learning, and this particular model for professional learning can serve as a framework for school improvement (DuFour, 2004; DuFour et al., 2010; Hord, 2007; Reichstetter, 2006; Weichel, 2012). Because the high school department in this study has only one PLC, with more common planning teams transitioning toward PLCs, an evaluation of the PLC could be useful for education stakeholders in order to implement effective PLCs in the future.

I probed into a new practice at the suburban school that was a shift in the traditional delivery of PD for teachers as is guided by the theoretical framework of the educational change theory (Fullan, 2007). Fullan (2007) described the educational change as a "learning experience" for the teachers and students (p. 85) and that educational change occurs when relationships are fostered and staff members collaborate. Fullan

claimed that changes to professional learning, such as the shift from traditional workshops to PLCs, can impact more than the individual teachers. The biology PLC has the potential to serve as agents of change with relation to team members, students, and other staff members. Based on Fullan's premise, the PLC members will be building the capacity of each team member though changing their pedagogy to shared and deliberate practice with a focusing on collaboration analysis (Fullan, 2007). Fullan listed three necessary conditions for the complexity educational change: change in (a) materials, (b) teaching activities, and (c) pedagogy. The teachers are not only meeting to discuss student achievement on collectively designed assignments, but also on revised activities through the pedagogical lens of problem-based learning.

In order to properly structure my evaluation of the PLC, I have based my inquiry on the characteristics of PLCs and how PLCs can impact student learning through collaborative, student-focused efforts. An extensive literature search began with the search string *professional learning community* using EBSCO. This led to several branched topics of *school improvement, instructional improvement, professional development, learning teams, reflection,* and *teacher leadership*. According to the researchers, an effective PLC as one that has (a) a focus on learning and teaching, (b) shared values and vision, (c) collaborative culture, (d) supportive and shared leadership, and (e) reflective professional inquiry (Clauset et al., 2008; Dufour, 2006; Nelson, 2009; Stoll et al., 2006; Yoon et al., 2007). The aforementioned characteristics of effective PLCs served as the conceptual framework for this study. The five characteristics of PLCs are discussed within the remainder of this section.

Focus on Learning and Teaching

School administrators have been researching PD opportunities to increase teacher collaboration and shared professional practice. Transitioning from workshops to job-embedded collaboration "to foster professional learning" is the new professional development model for many schools (Maher, Burroughs, Dietz and Karnbach, 2010, p. 25). International schools are using learning communities to promote collaborative learning experiences among staff members in order to increase student learning and are outperforming the United States on many international assessments (Wei et al., 2009). PLC meetings are focused on collective inquiry. According to the Standards for Professional Learning (Learning Forward, 2011), student-focused collaboration is typically achieved by examining student progress data, analyzing student work, investigating effective strategies, designing lessons, and developing common assessments. The team members are accountable to one another and they meet regularly throughout a common school week to engage in collective inquiry and collaboration (Learning Forward, 2011).

As schools in the United States make this paradigm shift toward collective inquiry, PLC meetings can be directed by scripted protocols to guide teachers and administrators through a meeting to stay focused on student learning (Nelson, LeBard, & Waters, 2010). Using these protocols can help develop more reflection and collaboration within the learning community. Schools also need to avoid confusing the time allotted for a PLC with the time dedicated for school logistical information, such as department meetings and monthly staff meetings. Using PLCs to disseminate or discuss school

agenda items will not allow the goals of the PLC to be met and undermines the power of the group (Miller, 2011). Schools that receive funding to help improve achievement often try several different initiatives each year and PLCs may lose their focus on student learning. Miller (2011) asserted that teachers must maintain their grassroots goals and objectives directed at helping improve student learning in order to bring about sustained change. Teachers working in effective PLCs could remain focused on student learning and develop collective strategies to assist their students throughout the academic year.

Shared Values and Vision

Schools need to have shared values and vision in order to have successful learning communities (Dufour et al., 2010; Roy, 2009; Troen & Boles, 2010). According to Roy (2009), shared values and vision are achieved when staff members "hear coherent and aligned support from all administrators about the importance and value of all initiatives" (p. 3). Faculty members must know that the entire school is dedicated to the vision of increased student learning and performance. There are differences between a school's vision or purpose and a school's mission statement (Dufour et al., 2010). Whereas many schools dedicate staff workshops to crafting school mission statements, there has been no correlation between a well-written mission statement and increased school effectiveness, and Dufour et al. (2010) reported that school PLCs function most effectively when there is a central focus driven by a clear vision of what is to be accomplished. Common pitfalls of PLCs often relate back to a lack of a clear vision shared among all stakeholders (Troen & Boles, 2010). According to Blanchard (2007),

A vision builds trust, collaboration, interdependence, motivation, and mutual

responsibility for success. Vision helps people make smart choices, because their

decisions are made with the end result in mind. Vision allows us to act from a

proactive stance, moving toward what we want. Vision empowers and excites us

to reach for what we truly desire. (p. 22)

PLCs must establish goals that have a "direct and observable impact on student

achievement" (Dufour et al., 2008, p. 159). Conzemius and O'Neil (2005) coined the

phrase strategic and specific, measurable, attainable, results-oriented, and time bound

(SMART). Continuous improvement is more likely to occur when a limited number of

goals are established and a common purpose and vision are shared by all members of the

PLC (Dufour et al., 2008). Early establishment of a mission and vision helps the group

determine why they are working together and where they envision their growth. The

grassroots approach to a PLC allows the teachers to develop a sense of ownership. When

directives from administration force teachers into PLCs, they are typically less effective

(Miller, 2011). As such, the goals, mission, and vision should be developed by the

classroom teachers in collaboration with administration and not simply imposed on them.

According to Stoll et al. (2006), PLCs are the most effective when the central purpose is

to enrich teacher efficacy in order to help students learn. Effective PLCs focus their

meeting conversations around the learners and deliberately discuss strategies to address

student misconceptions and achievement.

Collaborative Culture

Teachers are often isolated in their buildings and a collaborative culture does not exist. This isolation leads to "continued ineffective practices" because teachers lack a frame of reference for comparison (Schmoker, 2006, p. 24). Schmoker (2006) contended that most teachers never work with their colleagues to create lessons (p. 112). In comparison to the rest of the professional world, teachers do not typically work in teams. PLCs provide teachers with lessons in improving their craft and knowledge. According to Schmoker (2006), the meetings of a PLC ensure follow-up, encourage reflection, are results-oriented, and focus on essential common standards aligned with state assessments, providing a guaranteed and viable curriculum. A school culture focused on student success allows teachers the opportunity to plan more effective lessons and assessments during their PLC meetings with the shared expertise of all PLC members.

School leadership must support collaborative structures for sustained educational change. In one Scandinavia study of PLCs in schools, Sigurðardóttir (2010) determined that in order for schools to be effective with their PLCs, it is essential for school leaders to encourage collaboration among teachers, team teaching, and group reflection. Furthermore, these should be provided by building leadership and become an integrated part of the day (Sigurðardóttir, 2010). However, allocating time for teachers to collaborate does not necessarily lead to improved student learning. Troen and Boles (2010) indicated that teachers may be given planning time, but do not possess the "facilitation skills necessary to use the time effectively" (p. 59). Leadership is often needed within the group to remain focused on goals.

A paradigm shift from isolation to interdependence is an essential element for an effective PLC. The teachers are learners in their own right and engage in collective inquiry about ways to improve student learning. According to Dufour and Dufour (2007), a content-area PLC should engage in weekly discussions around the following items: (a) what students should be learning, (b) how teachers know they are learning, (c) how teachers will respond when students do not learn, (d) how teachers will respond when students do learn, and (e) what professional learning the team must engage in for student learning. Teachers meeting to hold learning-focused discussions are able to plan based on the combined expertise of the PLC.

Teacher expertise and collaboration are resources that can be used to bring sustained change to a grassroots PLC. According to Schmoker (2006), "Despite millions of teacher-hours" invested in workshops and staff development, the results on teacher effectiveness and student achievement are miserable (p. 108). The workshops perpetuate a top-down dependency from the teachers on curriculum writing, classroom management, and effective lesson planning from outside sources, rather than building their own competencies in these areas. In contrast, when teachers work in PLCs, the dependency cycle is broken and they are more reflective and effective in their "collective follow-up, assessment and adjustment of instruction" (Schmoker, 2006, p. 109). Most teachers working in isolation, without engaging in critical conversations about instruction, cannot hope to realize the gains experienced by teachers who participate in PLCs.

Teachers work together to improve classroom performance through research, collaboration, and data collection (Dufour et al., 2010). Teacher isolation has

"catastrophic consequences" on teacher efficacy by not allowing teachers to learn from and share with others in their own department (Schmoker, 2006, p. 26). As such, PLCs remove the isolation barrier and bring teachers together to plan effective ways to help students achieve (Dufour et al., 2010; Schmoker, 2006). Linder, Post, and Calabrese (2012) found increased camaraderie among teachers participating in a PLC which served to further fuel the work of the PLC. The development of trust among PLC members through ongoing collaborative discussions facilitated by protocols and groups norms can help build the capacity of the PLC and further the grassroots nature of the PLC vision for change.

Supportive and Shared Leadership

Teachers become empowered leaders through PLCs. Garrett (2010) recognized that a PLC is not a strategy that cannot work if only "imposed on teachers from above" (p. 9). The process requires administrative support, but not simply a requirement to meet with common planning time carved out in their day (Dufour & Dufour, 2008). Distributed leadership among the team creates a sense of ownership and shared responsibility, which can lead to increased professionalism within a PLC (Kennedy, Deuel, Nelson, & Slavit, 2011). By allowing teachers control of "their learning groups, their knowledge and expertise will grow and deepen" (Kennedy et al., 2011, p. 24). Within an effective PLC, the knowledge needed to help the students is determined and investigated by the teachers themselves. Teachers share leadership roles and expertise and learn from one another. District administrators should look to the collective expertise

of the existing teachers and not rely on outside agencies to provide them with costly

professional development on establishing their own PLC (Anderson & Herr, 2011).

Characteristically, PLCs adhere to a distributive leadership mindset. Distributive

leadership empowers staff members by giving them the support and focus to make lasting

change (Easton, 2011). Distributive leadership is not a delegation of job responsibilities

or distributing tasks. According to Spillane (2006),

> A distributed perspective offers an alternative way of thinking about leadership in
>
> schools by foregrounding leadership practice and by suggesting that leadership
>
> practice is constructed in the interactions between leaders, followers, and their
>
> situations…distributed leadership offers a framework for thinking about
>
> leadership differently. As such, it enables us to think about a familiar
>
> phenomenon in new ways that come closer to approximating leadership on the
>
> ground than many of the conventional popular recipes for school leadership. (p.
>
> 26)

In harnessing the leadership of the members of a PLC, administrators demonstrate

respect for the autonomy of the teachers and empower the teachers with the responsibility

to make collective decisions regarding best practices for student success. Many schools

face high levels of teacher and leader turnover. The openness of new leaders to the

concept shared leadership and their ability to "honor what has already improved the

school" is significant (Easton, 2011, p. 220). Distributing leadership responsibilities

among members of a PLC acknowledges the expertise and contributions of the teachers.

Several teachers within the biology PLC have leadership experience both within and

outside of their PLC which can be harnessed to use the existing strengths (Wilhelm, 2010). Martin (2011) asserted that all teachers can grow under leadership and teachers need leaders who create a collaborative culture focused on results. According to Murphy, Smylie, Mayrowetz, and Louis (2009), the principal plays a part in shaping school culture and in developing deeper pools of leadership. Administrators can leverage the existing leadership and experience of a department to build the capacity of a PLC in an initiating phase of implementation.

Reflective Professional Inquiry

PD for the teachers must be rigorous, reflective, and relevant to ensure student success. Despite the various initiatives for teachers within school district, one initiative of PLCs seems to have the most promise in making a lasting impact toward student achievement (Brookfield, 2008; Cranton, 2006; Day, 2000; Mezirow & Taylor, 2009). The characteristic of reflection is investigated more deeply to provide a context for understanding why PLCs can be used to develop the teaching capacity of the high school.

Teachers may enter the workplace with a certain content and pedagogical skill base and level of competency; however, without PD, they may not be able to adequately prepare their students with the skills they will need for the 21st century from an expanded toolbox of increased subject matter, reflection, collaboration, and leadership. Many realize that teacher quality is key to student achievement; yet, the requirements for basic licensure of teachers entering the workplace hold teachers to a minimum standard (Zuckerman, 2011). While beginning teachers may be qualified to instruct their students, teachers must evolve with the new information, technologies, and discoveries impacting

society. Many countries leading in TIMSS and PISA scores make greater investments in job-embedded PD for their teachers compared to the United States (Wei et al., 2009). High-performing countries on the TIMSS and PISA value PD of their teachers and offer long-term, sustainable PD to ensure strength in the teaching profession. Among Singapore's many investments in teacher professional learning is the Teacher's Network, established in 1998 by the Singapore Ministry of Education (Wei et al., 2009). The mission of the Teacher's Network is to serve as a catalyst and support for teacher-initiated PD through sharing, collaboration, and ongoing reflection.

Teachers need to continually update their professional knowledge and skills to prepare their students adequately for both college and the workplace. One way to raise student achievement is through teacher PD aimed at preparing teachers with the reflective skills needed to improve their own practice. According to Brookfield (2006), skillful teachers are critically reflective about their practices in the classroom. PD that encourages critical self-reflection allows teachers to identify their own strengths and weaknesses to create self-improvement plans. When teachers are actively engaged in PLCs, critical conversations about their daily choices occur. PLCs often use meeting protocols, which direct the professional conversations and include time for individual and group reflection about lessons and assessments.

Teaching is a profession, and like other professions, requires that those in it refresh their skills and knowledge base in order to meet the needs of whom they serve. The most effective teachers are reflective about their practice (Pedder, James, & MacBeath, 2005). According to York-Barr, Sommers, Ghere, and Montie (2006),

reflective practice is essential for professional competence and results in student achievement. Reflection is a necessary condition for teachers' learning (Brookfield, 2008; Cranton, 2006; Day, 2000; Mezirow & Taylor, 2009). As such, any PD that encourages reflection among teachers, such as the embedded reflection within PLCs, should be used within schools as a vehicle for sustained change.

Effective teachers use employ diverse strategies based on past experiences and adapt to their methods to meet the needs of their students as appropriate. According to Knapp, Copland, and Talbert (2003), leaders need "powerful reflective tools" (p. 11). Knapp et al. (2003) further contended that if teachers and districts are going to see educational improvements in their students, there needs to be a focus on PD that supports reflection, meeting diverse student needs, and community collaboration. In debriefing with their peers, teachers are able to gather evidence collectively and reflect on the potential solutions to a situation. PD which provides a format for teachers to meet frequently and use the collective professional

PD, which forces teachers to reflect on daily experiences, can help teachers learn how to adapt strategies and grow as a professional. According to Dewey (1933), students control their own learning process by reflecting on their experiences and become experts of their own learning. When teachers participate in meaningful learning experiences for professional development, they are more likely to develop a connection with what they have learned and adapt behaviors (Paris & Winograd, 2001). According to Harris and Jones (2010), reflective learning from daily experiences within the classroom and school environment can help teachers determine appropriate PD opportunities to increase student

achievement and when teachers meet frequently in PLCs to discuss lessons, assessments, and data, they are forced to reflect on a conscious level and become more aware of their daily decisions.

Reflection is necessary for teachers to make informed actions within classrooms (Brookfield, 2006). These conscious decisions made in the classroom by teachers show that they are not on what Brookfield calls "autopilot." Mezirow (2009) contended that perspective transformations of beliefs, attitudes and emotional reactions occur through critical reflection and that reflection best occurs when using critically reflective peers as mirrors through "social learning" (p. 133). As such, PD activities that result in learning through changing one's actions or thoughts are also transformative in nature. Responses to the open-ended questions by the biology teachers provided data on the characteristic of reflection within their PLC by asking the teachers to communicate their perception of how their experiences influenced their teaching practice and student learning.

Professional Development in New Jersey

The New Jersey Education Association (NJEA) defines PD as "comprehensive, sustained and intensive approach to improving teachers' and administrators' effectiveness in raising student achievement" (2009). NJEA also pointed to PD that is data and standards-driven, reflective, and collaborative opportunities embedded within the school context to enhance student learning. NJEA stressed that professional development should occur several times each week and engage teachers in continuous improvement strategies.

The New Jersey Professional Standards Board outlines twelve areas for New Jersey educators to focus on in their professional development. Recently, the push from

the NJDOE has been to shift away from professional development and toward collaborative professional learning with an obvious emphasis on PLCs in districts, schools and departments and should be standards-based. These standards stress data-driven and research-based methods to increase leadership, collaboration and quality instruction. In order for teachers to be highly effective, teachers need to work in concert with others in their content area to develop appropriate strategies for success. Teachers should reach out to the community and families as resources and stakeholders. Educators should select professional development activities that increase their ability to effect change in their schools. The data I collected about the PLC at the research site helped me determine if the current PLC is meeting the New Jersey PD standards for a learning community.

The New Jersey professional development standards are adapted from Learning Forward (2011), formerly known as the National Staff Development Council (NSDC), because they are widely accepted as the gold standard for planning high quality professional development. Standard 10 specifically states, and is cited in administrative code, that teachers should engage in, "professional development that improves the learning of all students organizes adults into learning communities" (NJDOE, 2011, p. 29). Evaluating PD within a school or department based on these standards can determine the strengths and weaknesses of programs. Educational leaders can then use this data to design more effective professional development.

Implications

I collected data through a survey of closed-ended questions and personal interviews with PLC members to evaluate the program's effectiveness and to make recommendations to the biology team, high school, and the school district stakeholders. The project direction included a focus on strategies for beginning and maintaining PLCs within the other science disciplines in the science department. Based on the anticipated findings from the data collection and analysis, suggestions for improvements could be made for the group as well as recommendations for planning more effective common planning time to permit collaboration. The aforementioned findings could help the team discuss potential areas in need of improvement and design an improvement plan. The findings included strategies for other PLCs in the school that the district could use with other district initiatives. A white paper has been created to provide recommendations and commendations regarding the biology PLC to school district administrators to use the strategies employed by the biology PLC to outline how to create and sustain effective learning communities throughout the school district. A website of helpful resources was created to help teachers with the creation of PLCs.

Summary

The goal of this educational investigation was to improve teaching and learning at the high school and provide a framework for sustained change. I outline and discuss in Section 2 the methodology for the program evaluation where I used a survey containing

closed-ended as well as personal interview questions about the experiences of the participants.

Section 2: The Methodology

Introduction

The focus of this investigation was to evaluate the effectiveness of a PLC at a suburban high school, which implemented PD among teachers in the science department. I present the basis for performing an outcome-based evaluation using a mixed method research design. The participants and research site are described. An explanation of the use of a survey and interview is contained in this section. Procedures for collecting and analyzing the data are discussed. Project limitations are also described.

Mixed-Method Design Approach

In order to obtain data from the participants' PLC experiences, a mixed-methods study was selected. Rich descriptive data were collected through qualitative probing beyond participant responses to a survey. A two-phase sequential evaluation began with an online survey designed by Olivier and Hipp (2010) on PLCs. The survey was hosted online by the Southwest Educational Development Laboratory (SEDL) through an agreement with the editors and was used to determine to which degree PLC members agreed or disagreed with statements about their own PLC. The SEDL survey was selected due to its high reliability and validity ratings. In addition, the SEDL website hosts an online version of the survey, which is available for use for a nominal cost and automatically calculates the mean and standard deviation for each question (Hipp, Huffman, & Litke, 2012). The second phase of the evaluation was interviews with

participants to review statements from the survey and gather further insight into the PLC's greatest strengths and shortcomings (Appendix B). This two-phase approach was justified because the participants could reflect on the survey questions before being asked deeper questions on their personal involvement in the PLC. The evaluation design was selected in order to provide district stakeholders with research-based findings. The data were collected from the participants through an online survey with closed-ended questions and through personal interviews. While I have been an administrator in the district, I was not the evaluator of any of the PLC members during the 2013-2014 school year. Through the information I collected during interviews, I was able to have a greater understanding of the inner workings of the PLC and how the learning community functions than through descriptive survey data alone. The surveys were anonymous and completed after school hours during nonacademic time. Raw data are found in the appendix from both the survey and interview questions.

Outcome-Based Evaluation

PD programs must be routinely evaluated to ensure goals are being met. According to Killion (2003), before beginning any program evaluation, a researcher should determine if the program is ready to be evaluated. The biology PLC was created in 2009. An evaluation of the program provided findings on meeting its intended goals and how it can be modified for improvements. I chose to conduct outcome-based evaluation (OBE) to understand how the participants could improve their group collaboration and organization in order to better serve their students. In studying the biology PLC, OBE strategy was used. The overall evaluation goals focused on the overarching research

questions: (a) what are the characteristics of the biology PLC? (b) how did PLC members benefit professionally from being a part of the learning team? and (c) what types of products has the team created to benefit students?

The aforementioned questions were asked through an online survey and interviews with the participants to identify the characteristics of PLCs exhibited in the Biology PLC, the team-created products, and how the members benefitted from their collaborative experience. OBEs are used to improve educational programs based on the available data and to ask how the project impacted those involved (Volker-Morris, 2004). For the evaluation of the PLC, I used a mixed-method design. The process was sequential and involved both a survey of the Biology PLC members on the actions and goals of the PLC and interviews with team members regarding their experiences with PLCs. In the survey questions, I elicited responses from the PLC members to identify what practices of an effective PLC were in place and the effectiveness of their PLC. Individual interviews provided a greater understanding of how the PLC was established and functions.

Justification of Outcome Based Evaluation

An outcome-based evaluation serves to identify if the desired results of a program are being met and what type of impact the program has on the participants (McNamara, 2009; Schalock, 2002). I used an OBE to determine if the program met its goals. The qualitative and quantitative data collected from the participants served to answer the research questions about the program outcomes. PLCA-R survey data provided information with regards to the characteristics of the PLC and the conditions of the school and department for effective PLCs. Personal interviews allowed me to evaluate

the program to determine what the members perceived are the greatest strengths and weaknesses of the program and what the professional benefits were as a result of being involved. The program evaluation helped me make recommendations regarding how to better serve the teachers and students at the high school.

I selected a formative, sequential mixed-method approach. According to Creswell (2009), a researcher must weigh all options when selecting a research strategy. Although the mixed-method approach presented challenges for me such as increased data collection and coding and analysis, the benefits of this strategy far outweighed the extra associated work. The evaluation was formative in nature because the program was ongoing and could benefit from an external program review from a researcher to make recommendations and highlight successes the participants may not see themselves. The evaluation of the data was used to assist the PLC in determining next steps for development and goal attainment.

Setting and Sample

The setting for this study was a suburban high school serving 1,610 students in a school district of nearly 10,000 students. The suburban school district has a long tradition of academic excellence and ethnic diversity. My study was limited to the teachers in the biology PLC for the HS2 campus of the regional school district. The participants taught at the research site of the evaluation. In order to be eligible for this study, a participant had to be an active member of the biology PLC piloting the project-based curriculum for the school year. The 2012-2013 biology PLC consisted of six biology teachers and three student teachers. One special education teacher joined the meetings at the request of the

PLC for resources, but was not a consistent participant. Three of the members were part of the initial cohort formed in the 2009-2010 school year to begin developing common assessments. Three of the teachers were tenured, with more than 3 years of teaching experience. Four teachers had more than 10 years of experience teaching biology. Five of the PLC members had been teaching for less than 1 year. The school had a long-standing relationship with several local universities to host student teachers and the biology PLC seized this opportunity to provide an arena for professional discourse and planning. PLCs are typically small in number because they consist of the teachers teaching a similar course. Of this team, I was the primary evaluator of two tenured teachers for the 2012-2013 school year. The sample size was justified because it represented the experiences of the PLC in this study.

The Context and Concurrent Strategy

Quantitative Approach and Description of Instrumentation Tools

In order to determine what characteristics of an effective PLC were in place with the biology team, an online survey was completed by the participants. The survey instrument was the Professional Learning Community Assessment-Revised (PLCA-R) because of its high validity and reliability ratings (Hipp & Olivier, 2010, p. 30). I used the survey instrument to gather descriptive statistics. Participants were mailed a letter inviting them to participate along with the web address and password to the online survey. The concepts measured by the PLCA-R were shared and supportive leadership, shared values and vision, collective learning and application, shared personal practice, supportive conditions and relationships, and supportive conditions and structures. In

addition to its high validity and reliability ratings, the PLCA-R was selected because the dimensions are scored expeditiously and is inexpensive to administer.

Processes for Reliability and Validity

The PLCA-R has been used throughout the United States as a tool to measure classroom and school practices as they relate to the dimensions of a PLC (Hipp & Huffman, 2010, p. 30). In an analysis of the PLCA-R, Hipp and Huffman (2010) has confirmed internal consistency with the resulting Cronbach's Alpha reliability coefficients for factored subscales ($n = 1209$): shared and supportive leadership (.94), shared values and vision (.92), collective learning and application (.91), shared personal practice (.87), supportive conditions-relationships (.82), supportive conditions-structures (.88), and one-factor solution (.97; p. 30). Each dimension is evaluated on the following scale: not initiating, initiating, implementing, and sustaining (Hipp & Huffman, 2010, p. 30). Teachers selected the descriptor for each characteristic that best described their perception of the PLC.

Process for Participants

In the process of completing the online survey, the participants were asked to rate their perception of key areas in their PLC. The questions were based on participant perceptions of the qualities and practices of the PLC. I identified the most frequent response on a scale asking the participants to rank their perceptions from *not sure* to *strongly disagree*. The survey responses carried a value of 0-4 points, where the response *not sure* carried no point value, the response *strongly agree* carried a weight of 4 points, and the response *strongly disagree* carried a weight of 1 point. Participants selected the

response that most closely aligns with their perception of the common characteristics in their PLC.

Response Calculation, Meaning, and Raw Data

The questions were grouped into the common themes of PLCs identified as essential dimensions and attributes for effective PLCs (Appendix F). The dimensions were analyzed for repetitious responses in either the positive or negative direction, thus showing strengths and weaknesses in the current program.

The survey instrument permitted multiple views of the data that were automatically calculated for each individual for the different dimensions. While the instrument was used to collect data from each participant, the data were anonymous and not directly linked to any particular teacher or administrator.

Explanation of the Data to Measure Each Variable

The data collected from the survey were broken down by descriptor automatically by the hosting site. The concepts measured by the PLCA-R provided feedback to identify where the PLC exhibited the greatest strengths and weaknesses with respect to shared and supportive leadership, shared values and vision, collective learning and application, shared personal practice, supportive conditions and relationships, and supportive conditions and structures.

<div align="center">

Qualitative Approach

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Participants were interviewed using open-ended questions in order to better understand their perception of how the PLC functions. Participants' responses to open-ended questions were collected in person. A survey of current practices and school

structures in place would have only provided minimal data with respect to an overall outcome-based evaluation. In order to understand if the biology team was effective at meeting its desired outcomes, I sought out complementary data through open-ended questions about participant involvement. Although the science department has seen some academic successes after their common planning group transformed into more of a true PLC, there may be certain desired outcomes that could benefit from an in-depth evaluation. Using accepted practices for a program evaluation, I obtained data from the participants to identify the goals; activities; products; and short-term, intermediate, and long-term outcomes (Killion, 2003; Wholey, 2010). For the purpose of this research, I sought ways to determine if the biology team was meeting its desired outcomes. In addition, the OBE also helped me identify effective practices of the PLC and areas where improvements are necessary to reach the participants' goals.

Processes for Reliability and Validity

To ensure the validity and reliability within the qualitative paradigm, I generated open-ended questions based on the key characteristics of the SEDL survey. I also provided the questions to a panel of university professors and teachers outside of the research site to refine the questions. The panel reviewed the questions and returned feedback to me on the structure and consistency of the wording in the questions as well as the questions' alignment to the common themes addressed by the online survey instrument.

Procedures for Gaining Access to Participants

As the science supervisor, I have been aware of who comprises each common discipline team in the science department. The biology PLC had been meeting monthly. The biology PLC had been meeting and sharing meeting notes with me.

A specific plan around the number and anticipated duration of open-ended responses

The 52-question PLCA-R survey was hosted online. The qualitative phase consisted of a traditional open-ended personal interview. Each interview took approximately 30 minutes to complete. I asked the participants about the PLC with regards to common assessments, goal planning and achievement, and group leadership. The participants were also asked to describe how PLCs impacted reflection and to discuss any lessons learned from establishing and maintaining the PLC. I coded the responses for emergent themes in the qualitative data. While the detailed responses from the open-ended questions required more time to code, the responses provided rich and thick description.

Methods of establishing a researcher-participant working relationship

I have an established working relationship with the members of the biology PLC. I mailed a letter to each PLC member detailing the purpose of the OBE, the research questions, and a summary of the PLCA-R and interview questions. I also highlighted the benefits of an evaluation of their PLC as the team moved forward and reminded the group frequently that their survey responses were anonymous and their interview responses were confidential.

Data triangulation

I used multiple sources of data when evaluating the PLC. Data included survey responses and individual open-ended responses by all team members. I observed PLC meetings and reviewed meeting minutes. I also reviewed the PLC's folder of shared curriculum documents and assessments developed over the 2012-2013 school year. All participants reviewed my findings to ensure their thoughts were captured.

Role of the researcher in the collection process

I was the science supervisor of a suburban school district. An ongoing mission of the school district is to continually evaluate the existing programs, one of which was the PLCs established after the 2009 science program review. My role was to invite participants to take part in the study through a letter asking the PLC members to complete the online survey containing closed-ended questions and to participate in an interview. I used traditional mail to invite PLC members to participate in the study and provided details of informed consent and the data collection process. Survey responses were collected online. Personal interviews took place after the surveys had been completed and scheduled based on the availability of the PLC members. Informed consent and confidential responses helped maintain the highest ethical standards in accordance with Walden University and the Institutional Review Board. Participants were made aware that my evaluation will be shared with school and district leaders and that their identity will not be released to any district or school administrators. Furthermore, the evaluation was not being used as an indicator of job performance by school or district administration.

Data Analysis and Validation Procedures

Quantitative Approach

The high ratings for validity and reliability on the PLCA-R provided justification for its use as a survey instrument. The PLCA-R reports scores on the following themes: (a) shared and supportive leadership, (b) shared values and vision, (c) collective learning and application, (d) shared personal practice, (e) supportive conditions – relationships, and (f) supportive conditions – structures. Each theme surveyed within the PLCA-R was independently and anonymously analyzed within the online survey. Data were graphed, and a mean and standard deviation was calculated for each theme (Hipp, Huffman & Litke, 2012). After each survey was completed, descriptive statistic was available for individual participants through the online hosting site. After approval by Walden University's Institutional Review Board (IRB), Biology PLC members were mailed an invitation to participate in the study and were provided with a link and password to the online survey.

Data Analysis

Upon completion of the surveys by the nine members of the Biology PLC, data analysis began. The mean score for each overall characteristic or dimension of PLCs was calculated and represented in Table 7. The highest mean score based on the survey data was within collective learning and application with a mean of 3.13, followed by shared values and visions with a mean of 3.11. As a team of teachers working through a new pedagogical approach and curriculum, the data showed that the team perceives they are

collaboratively working toward a shared vision to enhance student learning. According to

the diagnostic and planning tools of Hipp and Huffman (2010), the findings suggested the

PLC is considered implementing in this area (pp. 45-46). Within the characteristic of

shared practice, the PLC scored 2.79, which was the lowest mean score. As such, the

PLC could be considered in the initiating phase with respect to shared practice and

suggested room for growth (Hipp & Huffman, 2010, pp. 47-48). Except for the area of

shared practice, the analysis superficially suggested the team possesses characteristics

and is in an implementing stage in line with other typically successful PLCs.

Table 7

Summary of Survey Responses Based on PLCA-R Dimensions

Dimension	Mean Score	Standard Deviation
Shared and supportive leadership	3.09	0.52
Shared values and visions	3.11	0.50
Collective learning and application	3.13	0.54
Shared personal practice	2.79	0.57
Supportive conditions – relationships	3.07	0.65
Supportive conditions – structures	2.98	0.42

The mean, mode, and standard deviation were calculated for each question for

each characteristic. Data analysis from the survey indicated the majority of the PLC

characteristics regarding the dimensions of shared and supportive leadership, shared

values and visions, and supportive conditions – relationships are implemented by the

participants as indicated by "agree" responses as the most common response for all three of these dimensions selected by participants.

Discrepancies existed within the characteristic of shared and supportive leadership (Table 8) with respect to participant perception of principals being proactive and addressing areas where support is needed and leadership is being promoted and nurtured among staff members. However, most participants perceived the principal participates democratically, rewards innovative practices, and incorporates ideas from staff members. The analysis suggested that members of the PLC could benefit from administrators meeting with the team and asking for input on professional development needs to implement new approaches and ways to increase the leadership capacity of all teachers on the team. The strongest perception of shared leadership was reflected in responses to "Staff members use multiple sources of data to make decisions about teaching and learning." Five participants *agreed* with this statement, while four participants *strongly agreed*. This indicated the team does indeed collaboratively discuss data from their common formative and summative assessments to drive instructional practices for student improvement.

With respect to shared values and visions (Table 9), two participants perceived a lack of a shared vision for school improvement with an undeviating focus on student learning. One participant also indicated a lack of shared values supporting norms of behaviors that guide decision making. As this program evolved over the course of the 2012-2013 school year, it is likely student teachers from the Fall semester and teachers who were not present all school year have divergent perceptions from the team who

continued to implement strategies, norms, and protocols as the school year continued.
Nonetheless, it is imperative the team reiterates their vision at meetings and follows
norms that reflect their commitment to focusing on student work and practices to improve
student achievement.

Table 8

Summary of Responses for Domain 1: Shared and Supportive Leadership

Question	Strongly Disagree	Disagree	Agree	Strongly Agree			
	n	*n*	*n*	*n*	*M*	*Mo*	*SD*
Discussing and making decisions	0	1	7	1	3.00	3	0.50
Advice from staff members to make decisions	0	0	8	1	3.11	3	0.333
Accessibility to key information	0	0	8	1	3.11	3	0.333
Addresses areas where support is needed.	0	3	5	1	2.77	3	0.667
Opportunities are provided	0	0	7	2	3.22	3	0.441
Shares responsibility and rewards for innovative actions	0	0	7	2	3.22	3	0.333
Sharing power and authority.	0	0	8	1	3.11	3	0.601
Leadership is promoted and nurtured	0	2	6	1	2.89	3	0.333
Decision-making takes place	0	0	8	1	3.11	3	0.333
Shared responsibility	0	0	8	1	3.11	3	0.333
Use multiple sources	0	0	5	4	3.44	3	0.527

All participants indicated the school focuses on learning beyond test scores and grades (Table 9). As student engagement and a desire to refocus students on learning as a process served as the impetus for the new pedagogical approaches of standards-based grading and problem based learning, the findings suggest the overall focus is in line with the vision of the participants hold; however, the PLC could be better served by greater attention to the day to day workings through protocols and norms to focus on students.

Table 9

Summary of Responses for Domain 2: Shared Values and Vision

Question	Strongly Disagree) N	Disagree N	Agree n	Strongly Agree n	M	Mo	SD
Collaborative process	0	0	7	2	3.22	3	0.441
Shared values	0	1	6	2	3.11	3	0.601
Share visions for school improvement	0	2	5	2	2.78	3	0.667
Decisions are made in alignment with the school's values and vision	0	0	8	1	3.11	3	0.33
Developing a shared vision among staff	0	0	7	2	3.22	3	0.441
School goals focus on student learning beyond test scores and grades.	0	0	6	3	3.33	3	0.5
Policies and programs are aligned to the school's vision	0	0	6	3	3.33	3	0.5
Stakeholders are actively involved in creating high expectations	0	0	7	2	3.22	3	0.441
Data are used to prioritize actions to reach a shared vision	0	1	6	2	3.11	3	0.601

According to National School Reform Faculty Protocols (n.d.), PLC team could be provided with professional development. Participants identified areas for growth in collective learning and application (Table 10).

Table 10

Summary of Responses for Domain 3: Collective Learning and Application

Question	Strongly Disagree	Disagree	Agree	Strongly Agree			
	n	*n*	*n*	*n*	*M*	*Mo*	*SD*
Seek knowledge, skills and strategies and apply this new learning to their work	0	2	5	2	3	3	0.707
Collegial relationships exist among staff members	0	0	5	4	3.4	3	.527
Plan and work together	0	1	7	1	3	3	.50
Opportunities and structures exist for collective learning through open dialogue	0	4	5	0	2.6	3	.527
Engage in dialogue	0	2	6	1	2.9	3	.600
PD focuses on teaching and learning	0	4	3	1	2.7	2	.707
Stakeholders learn together and solve problems	0	0	6	3	3.3	3	.50
Stakeholders are committed to programs that enhance learning	0	5	4	0	2.4	2	.527
Stakeholders analyze multiple sources of data.	0	0	9	0	3	3	0
Stakeholders collaboratively analyze student work	0	0	9	0	3	3	0

Table 11 summarizes the responses of the PLC members regarding the shared personal practice. This particular characteristic received the lowest mean score of 2.79. Participants generally agreed staff members collaborate and informally share ideas. There is an opportunity for growth through peer observations and coaching positions to share practices and offer feedback. The white paper (Appendix A) offers specific recommendations for the PLC.

Table 11

Summary of Responses for Domain 4: Shared Personal Practice

Question	Strongly Disagree n	Disagree n	Agree n	Strongly Agree n	M	Mo	SD
Opportunities exist to observe peers and offer encouragement	0	7	2	0	2.22	2	.441
Feedback to peers related to instructional practices	0	0	6	3	3.33	3	.50
Share ideas and suggestions	0	0	7	2	3.22	3	.441
Collaboratively review student	0	1	5	3	3.22	3	.667
Opportunities exist for coaching and mentoring	0	5	2	2	2.67	2	.866
Apply learning and share the results of their practices	0	2	6	1	2.89	3	.601
Share student work to guide overall school improvement	0	2	6	1	2.89	3	.601

Table 12

Summary of Responses for Domain 5: Supportive Conditions – Relationships

Question	Strongly Disagree	Disagree	Agree	Strongly Agree			
	n	*n*	*n*	*n*	*M*	*Mo*	*SD*
Caring relationships exist among staff and students that are built on trust and respect	0	5	2	1	2.56	3	.726
A culture of trust and respect exists for taking risks	0	0	9	0	3	3	0
Outstanding achievement is recognized and celebrated regularly in our school	0	0	9	0	3	3	0
School staff and stakeholders exhibit a sustained and unified effort to embed change into the culture of the school	0	0	8	1	3.11	3	.333
Relationships among staff members support honest and respectful examination of data to enhance teaching and learning	0	0	6	3	3.33	3	.50

There appears to be a significant opportunity for growth in the area of relationships built on trust and respect, yet the members also state they are able to respectfully examine student data (Table 12). Specific recommendations for relationship building are found in the white paper (Appendix A).

Qualitative Approach

To make greater meaning of the data and to better understand the experiences of the PLC members, I also utilized open-ended questions via traditional personal interviews. The responses of each participant were coded based on the themes collected

in the quantitative survey of shared and supportive leadership, shared values and vision, collective learning and application, shared personal practice, supportive conditions – relationships, and supportive conditions – structures. Themes and characteristics of the survey and interviews are represented in Table 13.

Responses from the participants focused on relationships and time commitments influencing their perceptions of the efficacy of the PLC. A common thread from each participant was the amount of time that was necessary to meet and discuss student work, plan common assessments, and develop strategies for the new pedagogical approach. A strong influence over shared practices hinged on the relationships of the team members. Those who expressed their views of allowing others into their classrooms also indicated a focus on improving their approaches. Teachers who did not indicate they were involved in sharing their classrooms or observing other classrooms indicated the need for more professional development on problem based learning and differences in opinions with other PLC members.

Consistent with the quantitative data, the qualitative approach suggested areas of potential growth. The findings indicated the strengths of the program rest in the team's drive to shift from a traditional approach to teaching science to one of research-based practices for greater student engagement (Ravitz, 2009).

When shifting to a new approach, the need for sustained professional development is essential to support the teachers and students. Teachers who have received professional development in problem-based learning and providing student feedback should be utilized more frequently to model strategies in facilitating student

learning through this pedagogy. First year teachers in the district are offered workshops

in differentiation and problem-based approaches (District professional development

committee chairperson, 2010-2013, personal communication, September 1, 2013). A

recommendation supported by the findings is to include the PLC in these in-district

offerings as they proceed with implementation. Additionally, the team members all

strongly voiced a need for common planning time for all teachers embedded during the

day. While this may not be a viable option for all teachers to have a common period

every day due to scheduling constraints, it is recommended moving forward to adjust

schedules to allow teachers time to meet weekly during the contractual day in order to

support conversations about student achievement on formative and summative

assessments.

When teachers were asked to define the goals of the PLC, the responses varied

greatly. The team could benefit from clearly defining their goals and vision. The team

could share goals with an undeviating focus on improving student learning and

achievement in biology at every meeting. Shared vocabulary and consistent language will

also help the team move in a direction where all are stakeholders can "talk the walk"

(Dufour & Fullan, 2013, p. 31).

At this time, there is little evidence of shared goals among all of the teachers, but

the responses pointed to a shared vision shifting from traditional pedagogical approaches

to student-centered problem-based learning. One team member stated, "I don't think we

have any definitive goals" while another stated "I don't think it was verbalized." One

area that would help the team would be to develop SMART goals that are shared among

all members. This could provide the team with greater focus (O'Neill & Conzemius, 2005). While a vision may not have been memorialized in print by all team members, the general sense of a vision of changing the way in which Biology was taught came across in their responses.

A sub group was identified during the qualitative phase of the evaluation. This Honors Biology subgroup consisted of the student teachers and their cooperating teachers. These participants have embedded time in their work day to collaborate. Their responses to the prompts provided insight to the fact that embedded time allowed their team to create common assessments and talk about the student performance on the assessments. Participants also all articulated a strong vision to revise biology through problem-based approaches and standard-based grading. These members had at least 1 hour a day to plan with one another and their responses showed greater consistency in the vocabulary they used to express this vision. The other members of the entire team did not have embedded time, other than a shared lunch period. Members of the Honors subgroup met with the larger team in addition to their own common planning sessions according to the meeting minutes shared with me and the team on through Google Drive.

In order to further build a culture of trust and conditions that support personal growth, it is important for the team and administrators to use consistent and effective communication. Administrators must model consistency in their communication with the team as well. All members of the learning community could use the "same vocabulary, communicate a shared sense of purpose, and articulate the rationale that drives their work

with a consistent voice" (Dufour & Fullan, 2013, p. 31) If the team fails to meet, plan

collaboratively, and utilize the same common formative assessments, it undermines the

process. Furthermore, Dufour and Fullan (2013) contended:

> When teachers agree to work in collaborative teams to better serve their students,
>
> but individuals teachers continue to teach what they want when they want, assess
>
> however they want, and apply their own criteria to evaluating the quality of
>
> student work, it is clear that individual autonomy is the greater priority. (p. 25)

I used interviews to understand the types of products the team has created. The

team has identified power standards and developed a problem-based curriculum to

provide an engaging and relevant learning experience for their students. Participants also

co-created common assessments for six units of study as well as a common midterm and

final exam. Common laboratory investigations were also developed. Consistent group

evaluating of the products is not a practice currently in place with the members of the

entire PLC. Members of the PLC also highlighted their experiences with the team as

positive, although generally restricted by time and other duties. The participants did share

in their interviews that the mechanism of a PLC provided them with a reflective

collaborative environment to share ideas with their colleagues. None of the participants in

the study identified their experiences as overwhelmingly negative. Recommendations for

continued growth, based on the findings of the study, were shared with the department

through the white paper (Appendix A).

Table 13

Themes, Characteristics, and Coded Patterns of the Personal Interviews

Themes of PLCA-R	Major Characteristics	Coded Patterns
Shared and Supportive Leadership	Shared power and responsibility for learning; Distributive leadership; Culture of trust and opportunity for innovation; Leadership support; Accountability	leaders, change, support, administration attending PLC meetings, administration monitors practices, feedback to teachers
Shared Values and Vision	Collaborative processes; Shared values, vision, norms; Focus on student learning and data to support student achievement	grades, vision, group norms, protocols, consistency, agendas, focus on students
Collective Learning and Application	Collaborative analysis of student work; Respect for diverse ideas; Collegial relationships; Commitment to student success; Professional development on teaching and learning	common assessments, activities, curriculum, diversity, PLC contributions, professional development, problem-based learning
Shared Personal Practice	Constructive feedback; Collaborative review of student work; Coaching; Shared practice and student work	open classroom, feedback, coach, mentor, sharing, peer observations
Supportive Conditions – Relationships	Culture of trust; Recognition and celebration of success Change is embedded in culture Trusting, respectful relationships	collaboration, relationships, modes of communication, personalities, respect
Supportive Conditions - Structures	Schedule supports shared practice and planning Financial resources and materials	common planning, schedules, mobile devices, workshops

Integration of Quantitative and Qualitative Approach

The individuals were asked open-ended questions for each of the themes

measured by the PLCA-R to provide greater feedback and a more holistic evaluation

of the PLC. Once all open-ended responses were fully coded, a comparison of both the

quantitative and qualitative data served to validate the overall participant responses

(Hatch, 2002). I used triangulation including PLCA-R responses and individual open-

ended question responses by all team members. Individual member checking was utilized to verify that each transcribed interview captured the participants' intents through email. Rather than focusing on the responses of one of two PLC team members, or on just the responses to one instrument, I selected to use multiple forms of data collection for more trustworthy data (Mills, 2003). Findings are presented along with more detailed tables in the appendixes and white paper. The data analyzed from both approaches served to identify the characteristics that exist through descriptive statistics gathered from the survey as well as the emerging themes expressed in the responses to the open-ended questions. The quantitative data provided a base-level understanding of the existing conditions; however, the rich description provided by the open-ended questions enhanced my understanding of why certain conditions exist, how the team can move forward, and how other teams can benefit from the lessons learned by the biology PLC.

Participants' Rights

Participants were informed of the research topic, data collection methods and goals of the evaluation before they consented to participation. PLC members were provided with hard copies of the IRB approval and an informed consent form. I explained to the participants that they may withdraw at any time from the study. Signed consent forms were collected from all volunteers. The participant identities will remain anonymous and data were not collected in a manner where participants perceived coercion. Participant names have not been included in any data presented to

school officials. No personal information about the members of the PLC will be disclosed as a result of participation. Despite the potential risk of members feeling obligated to take the survey, all participants were assured their survey responses were confidential, their interview responses were confidential, and there were be no negative consequences if they determine they did not want to participate.

Assumptions, Limitations, Delimitations, and Scope

I assumed that professional relationships such as mentoring and coaching have an impact not only on the teachers, but also on the students as well, by producing more competent teachers with greater access to resources. Collaboration among teachers, through a learning community, was also assumed to positively impact student achievement in that it fosters communication among teachers, which may improve knowledge of material and access to resources.

One potential limitation of this study was that participants may have had biases or exaggerated opinions of their input for activities associated with the PLC. The participants' bias could have influenced their survey responses. Teachers reporting their own data and may have misrepresented the survey data in order to impress the researcher (Leedy & Ormrod, 2005). While anonymous survey data were collected to reduce this possible limitation, triangulation was used to increase validity, and this study was limited by the responses of the participants. The participants of this investigation were volunteers and could have withdrawn from the study at any time, although this did not occur.

This study was delimited to an evaluation of the biology PLC at the high school implementing a new problem-based curriculum pilot. In addition, bias may have existed based on relationships with participants because of my supervision role. Due to the possibility that some teachers may not recognize themselves as part of a PLC, because they are typically considered a discipline team by school administrators, definitions that clearly describe the effective PLCs were included to improve clarity. Furthermore, because this was an evaluation of a small department in a suburban school, the findings from this research may not apply to others. The scope of the investigation did not include survey data from science teachers outside of the Biology PLC.

Section 3: The Project

Introduction

The program evaluation was completed to determine if the biology PLC was achieving its intended outcomes and what impact the PLC had on its members. The white paper (Appendix A) based on the evaluation of the biology PLC is discussed in this section where I present for stakeholders the findings, literature review, and recommendations for continued success of the PLC.

Description and Goals

This evaluation resulted in a white paper with recommendations for the team and district administration. As many forms of PD were being implemented throughout the suburban district, the research behind highly functioning PLCs can be leveraged to support the team as a model for job-embedded PD focused on student learning. The goal of the white paper (Appendix A) was to highlight the characteristics of the current PLC and to suggest recommendations to address any gaps in practice.

The mixed-methods formative evaluation was conducted with the triangulation of data from open-ended interviews with members of the PLC, responses from an online survey, and a review of PLC meeting notes to determine where, on a continuum of practice, the biology common planning team meets the definition of a PLC. Analysis of the survey data was facilitated by the hosting site with the mean for each characteristic automatically calculated. Further descriptive statistics for each characteristic based on the individual survey questions were manually calculated for mean, mode, and standard deviation.

Qualitative analysis was completed by coding of the interview responses based on themes of shared and supportive leadership, shared values and vision, collective learning and application, shared personal practice, supportive conditions and relationships, and supportive conditions and structures (Hipp & Huffman, 2010). The evaluation provides stakeholders at the research site with findings that could support the vision of the PLC and the mission of the school district.

Rationale

The white paper (Appedix A) may be used by stakeholders to review highlights of the most significant points of the study and a summary of the findings. Most stakeholders, including teachers and administrators may not have the time to read through an entire dissertation. The white paper could be read by both teachers and administrators to begin a dialogue to improve learning communities.

This project was developed to present the information gathered through the mixed-method, formative program evaluation to the members of the Biology PLC and district stakeholders. According to Guskey (2002) and Muijs and Lindsay (2008), as with all professional development, it is essential to evaluate programs to ensure effective practices are in place in order to increase student success. District funding for PD is allocated each year to administrators and findings from this evaluation can help target funding to better meet the needs of the staff members with more effective implementation of the PLCs.

The research was conducted through the use of an anonymous online survey to identify the characteristics of effective PLCs within the Biology PLC. Personal

interviews were conducted to collect qualitative data with respect to the perceived professional benefit of PLC participation and product creation. The strengths of the team were within collective learning and application with a mean of 3.13, followed by shared values and visions with a mean of 3.11 (Table 7). An area of concern was within shared practice with a mean score of 2.79 on a 4-point scale (Table 7). This was the lowest mean score calculated from the survey. As such, the PLC could be considered in the initiating phase with respect to shared practice and suggests room for growth (Hipp & Huffman, 2010, pp. 47-48). The team members reported several products that were cocreated, including curriculum documents, common assessments, and common laboratory investigations through their personal interview responses and was verified within the Google documentation.

Review of the Literature

This evaluation was based on the premise that PLCs provide schools with a viable option for PD to sustain change (DuFour, 2004; DuFour et al., 2010). Reflective learning from daily experiences within the classroom and school environment can help teachers determine appropriate PD opportunities to increase student achievement. According to Harris and Jones (2010), when teachers meet frequently in PLCs to discuss lessons, assessments, and data, they are forced to reflect on a conscious level and become more aware of their daily decisions. Teachers who meet in effective PLCs hold learning-focused conversations about their students. During PLC meetings, teachers engage in meaningful discourse about effective teaching strategies and co-develop common lessons. PLC meetings give teachers the opportunity debrief and reflect collaboratively.

This evaluation was guided by the theoretical framework of the educational change theory (Fullan, 2007) where educational change serves as a *learning experience* for the teachers and students. Fullan claimed that changes to professional learning such as the shift from traditional workshops to PLCs that can impact more than the individual teachers. The biology PLC has the potential to serve as agent of change with relation to team members, students, and other staff members.

Two areas that were not discussed in the earlier literature review are the pedagogical approach of problem-based learning and the evolving Next Generation Science Standards. These two areas were researched in the same manner as earlier themes through multidisciplinary searches on EBSCO and I systematically compiled a variety of resources from journals, Walden dissertations, and professional literature on science pedagogy. EBSCOhost and ProQuest were used to search for *professional learning community*, *school improvement, communities of practice, instructional improvement, professional development, learning teams, reflection, teacher leadership*, *problem-based learning, science problem-based learning, biology pedagogy, Next Generation Science Standards, science teacher professional development, online communities of practice, pre-service science teachers, workshops for science teachers,* and *science teacher training*. A comprehensive search of the literature was limited to the last 5 years to find appropriate and meaningful research-based findings. These additional resources allowed me to make recommendations for potential growth based on an emerged theme of a need to address science standards through a newly established problem-based learning curriculum.

Addressing Standards Through Problem-based Learning

In addition to the development and adoption of standards in literacy and mathematics under the common core state standards (CCSS) initiative, science standards have also been revised to redefine science literacy and scientific inquiry through the Next Generation Science Standards (NGSS) based on A Framework for K-12 Science Education (National Research Council, 2012). The new science standards are not a revision of content, but fundamentally shift science education toward inquiry-based approaches (Duncan & Rivet, 2013). As with the CCSS, states have the option of whether to adopt these standards in lieu of their local standards. The NGSS were developed by the nonprofit organization Achieve with the input of 26 lead states and underwent revisions based on public feedback (Stage, Asturias, Cheuk, Daro, & Hampton, 2013). The NGSS have not been adopted by New Jersey; however, as a lead state in the process, it is anticipated they will be adopted (Michael Heinz, State Department of Education, personal communication, August 10, 2013).

Problem-based learning (PBL) is one approach to learning. In PBL, students work in collaborative groups to investigate, explain, and potentially solve authentic problems (Hmelo-Silver, 2004). An important aspect of PBL is the self-directedness of the students as they investigate and identify their own "knowledge deficiencies" (Hmelo-Silver, 2004, p. 236). Both the CCSS and NGSS focus not only on content, but 21st century competencies as well, and as states implement these new standards, PBL provides strategy for deeper thinking (Boss, 2013). Ravitz (2009) stated that the strengths of PBL rest not only in assessments gathering information on student understanding, but also in

"application of knowledge and principles" (p. 5). With projected assessments tied to the Common Core and NGSS, students will need to apply their knowledge. PBL offers a potential research-based strategy that will better prepare students not only for high-stakes testing, but in applying their understanding to novel situations. Mayes and Koballa (2012) suggested leveraging the PLCs within the science department to review NGSS and CCSS-M standards together, selecting real world grand challenges to engage students in cross-discipline, problem-based episodes.

   One struggle echoed by the teachers in this evaluation revolved around their insecurities of leading a PBL classroom. None of the participants mentioned having ever been taught through this pedagogy themselves, nor receiving professional development on how to properly implement the strategies. Many on the team are relying on one another to research articles and strategies and turn-key ideas in planning sessions. For many of the teachers in the study, the greatest challenge to the PBL curriculum was adapting themselves to a new facilitator role and helping the students self-regulate their own learning and progress. According to English and Kitsantas (2013), the switch from passive learners to active, collaborative, self-regulating learners is an essential component in a successful PBL classroom and professional development is required to build the capacity for the teachers to lead this transition effectively.

        Education reformers recognize the need for changing pre-service teacher programs to include learning through different approaches, such as PBL, and shifting from more traditional modes of teacher education (Etherington, 2011). While the majority of research on PBL refers to its use in the medical field and is emerging use in

education in the classroom, little has been published on providing teachers with the background to enact a PBL classroom.

In a study on elementary pre-service teachers, Etherington (2011) found the students themselves were not distracted by the newer approach to learning science, but the pre-service teachers needed help to "move away from the checklist mentality for completing tasks" (p. 50). Etherington found it essential for the pre-service teachers to remain active in the learning process alongside their students and to serve as "cognitive coaches" of their learners (p. 50). This study has been significant to the team because of our relationship with the colleges and our ongoing support and placement of student teachers in our science classrooms, particularly biology. The team has the potential to shift their pedagogy through sustained, job-embedded professional development teaching each other about PBL. Furthermore, the impact on the pre-service teachers who also previously had never been taught through or about PBL will have greater tools to reach their future students.

Pepper (2013) conducted a study with primary level pre-service teachers in Western Australia to determine if their exposure to a PBL experience would increase their confidence to plan and deliver science investigation with their students (p. 23). While the pre-service teachers were familiar with constructivist theory from their university training, they were unfamiliar with PBL approaches. As part of the study, the pre-service teachers were prompted to develop an investigation for students to complete during their teaching experience on energy and change. Pre and post surveys were completed to determine the levels of confidence and attitudes toward teaching science

before and after completing the PBL exercise. Final survey results indicated 83% of the pre-service teachers perceived "themselves likely to use PBL in their own science classes in the future" (p. 26) and described their approaches in more positive terms after having completed the curriculum building exercises. Pepper's research supports the impact of the Biology PLC as they work together, teachers and pre-service teachers alike, in sharing practices and pedagogical skills and constantly adapting strategies through a problem-based curriculum.

Leveraging Time More Effectively Through Online Communities of Practice

With several teachers in the biology PLC with young children, meeting after school has been a challenge to maintain. However, many teachers continue to discuss student work and upcoming projects through email or video conferencing. The sustained use of online communities could increase productivity and collaboration for the PLC. Web 2.0 tools are collaborative in nature and encourage knowledge sharing and development through vast social networks (Greenhow, Robelia, & Hughes, 2009). Examples of these tools that expand traditional learning spaces to cyberspace include Twitter, Edmodo, email groups, and wikis (Wesley, 2013). Twitter is one tool being utilized by many educators who form online communities to exchange ideas through the use of chats on identified topics with short messages of 140 characters or less (Greenhow & Gleason, 2012). Wesley (2013) investigated the use of microblogging as a professional learning tool for World Language teachers. Wesley found that teachers who actively participated in Twitter developed new strategies and benefitted from the collaboration.

As there are weekly Twitter chats dedicated to problem-based learning, standards-based grading, and other educational topics, this is one specific resource the biology teachers could certainly take advantage of to further their learning. This option would allow the teachers to participate in a larger learner community where the knowledge base of using the pedagogical approaches would be more extensive.

Jacobs (2009) described the power of the "networked" teacher and PLC. When a PLC becomes networked through physical and online environments they are able to "communicate, collaborate, and share ideas, data, strategies, and information." This extensive network Jacobs (2009) defined as the Professional Networked Learning Collaborative (PNLC), where each member acts as a "portal or node" to make the "PNLC exponentially stronger, knowledgeable, and wise." The biology PLC could build an online community of practice or expand to a PNLC to share their ideas and allow each member to have a voice in ongoing discussions. Vehicles for increasing collaboration may include collaboration tools such as Edmodo for an online discussion forum, Google Hangouts for online meetings, Twitter chats about topics related to the needs of the PLC, and Google Drive for sharing and collaborating on documents (Office of Educational Technology, 2011). Using a site to post and respond through asynchronous dialogue would permit greater collaboration and contributions from everyone. Establishing a weekly online meeting could allow all of the teachers to participate at a more convenient time and share information gather through their own expanded networks. Transforming the biology PLC into a fully networked PNLC would better serve their students because each teacher will have "input, advice, and constructive feedback, in a real time

collaborative environment" (Tom Murray, personal communication, Director of

Technology and Cyber Education, Quakertown Public School District, January 27, 2014).

Implementation

The findings and recommendations of the program evaluation were shared

through the white paper with the PLC and administrators. A copy of the white paper has

been posted on the department website to allow it to be shared with district stakeholders.

Future implementation of the recommendations will rely on the willingness of the

teachers and administration. The PLC will continue to evolve as a team through

immediate use of PLC meeting protocols at all sessions and by reviewing group norms

prior to beginning any meeting. Professional development offerings to support the PLC

on PBL and standards-based grading are being offered this school year and all members

have been encouraged to attend the specific sessions.

Potential Resources and Existing Supports

Potential Barriers

While recommendations have been made, time and financial resources continue to

serve as potential barrier to implementing some suggested changes. Based on the

available rooms and times available to schedule teachers, it may be impossible to

schedule all members of the Biology team with a common planning period during the

weekly cycle. There are four required meeting times after school for high school teachers

in the district. Contractually, each teacher is required to meet with their common

planning team once per month after school hours. The remaining three meetings are used

as faculty and department meetings. District administration could leverage this time to allow for greater collaboration and focused discussions with all of the teams.

Garnering support and creating boundaries for classroom visits and peer observations will need to be discussed in detail with the team members and the local union. Strict adherence to protocols and objective visitations which are non-evaluative in nature will be necessary to build the capacity of the team and trust among team members.

Existing Support

There are support systems in place for the team to promote their continued growth, such as structured meeting time after school and allotment of professional planning time during the school day. The white paper (Appendix A) provides recommendations and guidance for the team moving forward. The continued growth of the team will be dependent on the willingness of all stakeholders to review and accept the recommendations of the program evaluation. Monthly workshops on PLC topics such as PBL and standards-based grading have been occurring and have been attended by several members of the biology PLC. Several members of the PLC are networked on social media sites such as Twitter and are already utilizing Google Drive to share documents. Minor changes in practice will allow the team to meet both in person and virtually to maximize their efficiency. Existing district workshops on how to use Twitter and Google are available to support the team as well.

Proposal for Implementation and Timetable

As a formative evaluation provides insight for the team that can be utilized to make ongoing improvements, the proposed implementation of recommended changes is immediate dependent on district approval. PLCs must establish specific goals that have a "direct and observable impact on student achievement" (Dufour, Dufour, & Eaker, 2008, p. 159). Conzemius and O'Neil (2005) coined the SMART acronym to mean: strategic and specific; measurable; attainable; results-oriented; and time bound. Continuous improvement is more likely to occur when a limited number of goals are established and a common purpose and vision are shared by all members of the PLC (Dufour, Dufour, & Eaker, 2008). During the rollout of suggested improvements, the writing of SMART goals, setting up consistent meeting dates and times, and writing clear norms for the interactions taking place both in person and online are critical. This will help focus the group on the specific interactions during meetings and collaborative experiences in person and online. It will also help build trust among the members as there are both new and additional pre-service teachers working with the team. Establishing SMART goals and reinforcing the use of collaborative tools such as Edmodo and Google Docs will allow the team to communicate more frequently and stay focused on the goals established by the group.

Roles and Responsibilities of Student and Others

Building and district administrators must continue to support the ongoing development of the team. Attending meetings and sharing the same focused language can help build the capacity of the PLC. Administrators can also continue to solicit members

to serve as leaders within their own area of expertise. All team members will need to be trained on the effective use of protocols. As district administrators have been trained on using protocols to evaluate common assessments, these individuals can be called upon to assist with training the teachers through modeling.

Project Evaluation

The overarching goal for the project was to generate recommendations based on the program evaluation of the biology PLC. The questions posed through the online survey and personal interviews identified: the characteristics of PLCs exhibited in the biology PLC, the team-created products, and how the members are benefitting from their collaborative experience (Volker-Morris, 2004). The recommendations are based on both the quantitative and qualitative analysis of the program, which were triangulated through member checking of qualitative responses and a review of the PLC meeting minutes and common assessments. The white paper serves to assist the team and district leaders as they strive to restructure professional development through the strategic use of learning communities.

Professional learning communities are one professional development tool all teachers. As this is an ongoing process, continued use of the survey will allow the team members to gauge areas of strengths and weaknesses through their growth as a team. The data were collected in July 2013 and can serve as a baseline and each subsequent survey to provide the team members and administrators with a course of action for constant improvements.

While the team has identified standards for students and written curriculum together, there is still a lack of strongly articulated SMART goals. The team also lacked many of the traditional structures that would help the PLC function more smoothly. It is recommended that the team spend time putting structures in place to build trust and focus for the group. As this is a newer team of individuals, team building exercises embedded in the meeting time can help the members develop the type of team work and trust that is essential in the cycle of inquiry.

The PLC requires continued coaching in the pedagogical approaches and in developing quality common assessments. The team also needs continued support with using protocols to objectively evaluate their common assessments and the student responses. Administrators who already use protocols in assessing district common assessments could serve as a model for the team.

Time is one resource every participant referenced during their interviews. An emphasis during scheduling must be made to embed time during the contractual day for teams to meet, plan, review, and revise practices. In addition, it is recommended that the team leverages technology to make better use of their time. The biology PLC could build an online community of practice to share their ideas and allow each member to have a voice in ongoing discussions. Vehicles for increasing collaboration may include collaboration tools such as Edmodo for an online discussion forum, Google Hangouts for online meetings, Twitter chats about topics related to the needs of the PLC, and Google Drive for sharing and collaborating on documents (USDOE, 2011).

Ongoing conversations and surveys with the professional learning community will be essential to help guide the team to even greater success. Many of the current strategies are helping the team and their students, but through more concerted efforts and mindful practices, the team will undoubtedly make even greater strides. Building and district administrators should continue to monitor the team and support their learning.

Implications Including Social Change

Local Community

By increasing the capacity of the biology PLC through this mixed method, formative evaluation, the learners within the school benefit from a team better prepared to objectively plan and review student work and create common assessments to assess student growth and achievement. With recommendations utilized by the team, the district benefits from an improved PLC who can serve as a model for collaboration and shared practice focused on student learning for workshops and instructional rounds. Teachers across the district will be able to learn from the recommendations through the evaluation and district administrators can also utilize the PLCA-R within their own schools to gauge the progress of the own learning communities.

Far-Reaching

A far-reaching implication identified through this evaluation is how the biology team's continued partnerships with state universities can impact the pre-service teachers by being part of a more effective PLC prior to entering the profession. The daily interactions through co-planning with a number of teacher, having open classrooms to observe one another and share their practices, and reflecting on student growth will

ultimately impact the professional lives of the pre-service teachers as they move into fulltime teaching positions in other school districts. The lessons learned from contributing to and learning from a PLC will affect their own classrooms in the future.

Conclusion

In this section, I have provided information regarding the outcome-based evaluation of the PLC and the white paper generated. Literature related to problem-based learning was included to provide a greater context to the education change theory framing the evaluation. Local and far-reaching implications for social change were discussed. In Section 4, I will reflect on the strengths of the program evaluation and white paper as well as my own growth as a scholar and change agent.

Section 4: Reflections and Conclusion

Introduction

In this section, I include my reflections and conclusions on the program evaluation I conducted of the biology PLC in a local setting. This study was conducted to analyze the characteristics of one district science common planning team, determine if they are meeting their intended goals, and to identify the benefits of the PLC on the team members.

Project Strengths

This study is relevant as the shift toward new pedagogical approaches and curriculum necessitate the team to work collaboratively and with the strengths of each member to meet the needs of our students. As a mixed-method program evaluation, the findings provided the stakeholders with rich descriptive language to have a greater understanding of the PLC and how they can continually improve. The findings can be used by district administrators to target PD for the teachers. The PLC program can be replicated for other teams of teachers and recommendations from this PLC can be applied to others as well.

Recommendations for Remediation of Limitations

In order to overcome the greatest limitation inherent in the program evaluation, my dual role as the researcher and district administrator for the science department, half of the data were collected anonymously. While I was not the primary evaluator of the participants, they could have felt obligated to participate based on my role in

administration. All PLC members were made aware of the voluntary nature of the study and all participated.

Another potential limitation of this study was that teachers may have had biased or exaggerated opinions of their input for activities associated with the PLC. The participants' bias could have influenced their survey responses. Teachers reporting their own data and may have misrepresented the survey data in order to impress the researcher (Leedy & Ormrod, 2005). While anonymous survey data were collected to reduce this possible limitation, and triangulation was used to increase validity, this study was still limited by the responses of the participants. Future evaluations of the team could be done through completely anonymous data collection to further reduce perceived coercion from a district administrator. In addition, all department teams can participate in the PLCA-R moving forward and allow each team to see their data and recommendations for growth.

Based on the findings and reflecting on the study, there were other ways this program evaluation could have been conducted. The limitation of one point of collection could be shifted to allow for the team to be surveyed at different points in the continuum to evaluate for the growth of the team. Future evaluations of this and other PLCs should include multiple data points. Focus groups might also provide a different perspective than individual personal interviews and allow the participants to build off of each response.

Scholarship

While I was conducting this study, I reviewed literature related to educational change theory, PLCs, program evaluation, and techniques related to data collection and analysis. The vast amounts of information consumed from various sources allowed me to

find ways apply to guide my study and assist the PLC with recommendations moving

forward. Through peer review of my work, I was able to reflect on my research and

forced to defend my choices. As a scientist, I have an appreciation of the repetitive cycle

of inquiry and was able to foster my love of learning through this journey. Being

engrossed in several years of research has afforded me the opportunity to investigate a

local problem and develop recommendations to make lasting change within science

education.

Project Development and Evaluation

I learned that in order to evaluate the program, I would need to conduct research

by speaking with previous and current administrators about the various schools and

departments and learning from past practices. I also have a much greater personal

understanding of the iterative process of both research and program evaluation. Finding a

mechanism to deliver the research to the stakeholders in a convincing, yet nonthreatening

manner, was essential to me as both the researcher and administrator. The white paper

allowed me to present objective findings to the stakeholders and make recommendations

based on support from the literature and data from the team.

Leadership and Change

I have learned that the greatest way to lead change is to be a part of the process

and model the expectations. More importantly, I learned that all leaders must listen more

than they talk. By listening to the teachers, I was able to obtain a greater understand the

strengths and weaknesses of the program and find ways to help the team progress.

Williams also recommended "snoopervision" as a way to let go of managing techniques

over time as a supervisor and to monitor the PLC meetings on the outskirts by observing the meeting minutes and products live as they are created in their Google Docs (personal communication, September 1, 2013).

Analysis of Self as Scholar

There have been learning opportunities for me as a scholar. I found myself immersed in so much literature that there were times I was unsure of where to begin. While there have been times in my life as a student I may not have been completely driven by the process, being in control of this evaluation and this research brought me to a new level of personal learning. I developed a greater understanding of constructivism as I attempted to make meaning of all the literature I was reading. I have become more self-directed and organized in my process of learning and found myself seeking out the advice of others who have gone through doctoral work to stay focused, while practical with my time.

Analysis of Self as Practitioner

I found myself in a dual role investigating the PLC. What I learned about my leadership over a short period of time thus far is that I need to be more explicit and consistent in my communication with the teachers. In addition to the creation of a white paper which was shared with the department and district administration, I developed a department blog to archive all of my communications. The creation of the blog resulted from the feedback I received through the personal interviews. The blog also serves to inform the staff of current and upcoming initiatives. A direct result of this evaluation was the development of a resource page with hyperlinks for all teachers to use. Through their

continued feedback of time serving as a roadblock, I used the department blog to consolidate resources in one location for the teachers.

Analysis of Self as Project Developer

In the process of developing a white paper with recommendations for the team and district, I found myself not only reading through current research, journal articles, and professional literature, but also connecting with several experts through social media in order to present the team with the most useful information. Rather than relying on quotes from the literature, I sought out the people who wrote the articles and connected with their teams so that the recommendations were targeted and appropriate. I did not want to rely on a cookie cutter message from a survey and repeat to the team what characteristics they currently exhibit. I strove to push myself to a place where I was leveraging my own connectedness as an educator to pinpoint the areas the team could stand to grow and asked others for recommendations as well.

The Project's Potential Impact on Social Change

By increasing the capacity of the biology PLC through this mixed method, formative evaluation, the learners within the school will benefit from a team better prepared to objectively plan and review student work and create common assessments to assess student growth and achievement. An impact on social change is through the biology team's continued partnerships with state universities. The experiences of the pre-service teachers by being part of a more effective PLC prior to entering the profession

could impact their classrooms and relationships with future learning communities in various school districts.

The biology PLC has the potential to transform into an expanded PNLC (Jacobs, 2009). The physical and virtual networking of the PLC will allow the teachers to share their experiences to a vast network of connected educators to inform secondary education programs and aid others implementing similar programs.

Reflection on Importance of the Study

This program evaluation and corresponding white paper (Appendix A) contributed to the professional learning of the staff members within the PLC and to the district as a whole. The lessons learned through the evaluation provide recommendations of ways to focus professional development efforts, in particular through the use of PLCs, more effectively with a stronger emphasis on student learning. This process has also helped me grow professionally within my role as an administrator and develop research skills in objective program evaluation to effect greater change in the district science PLCs. This research has been significant as it will help the district administrators and biology teachers make decisions about professional development, curriculum modifications, and the continued partnerships with universities for hosting pre-service teachers. The processes of program evaluation and research are both iterative and this evaluation can serve as a tool for others as they seek tools to utilize and improve for their own evaluative purposes.

Implications, Applications, and Directions for Future Research

As teams in high performing districts look to develop ways to engage all of their students and tighten achievement gaps, the use of effective PLCs provides a vehicle for change. The dynamics of the team are vast consisting of pre-service, new, and veteran teachers. The PLC developed ways to use the strengths and experiences of all members.

Applications of this study could take place through workshops and ongoing coaching of the learning teams throughout the district. My research on effective professional learning communities can benefit the team and district through supporting ongoing professional development and in-district programs.

Through this investigation of the current biology team, one aspect of the team became very intriguing for future research. The continued use of pre-service teachers provides a clinical model very similar to the medical field in promoting instructional rounds, group planning, and shared practice. Future research on the impact of the co-teaching classroom with a mastery approach could have tremendous implications on the educational field. This model, born as a subgroup within a professional learning community, could provide mechanisms for restructuring pre-service education and the cooperating teacher relationship. The work of Weseley (2013) with World Language teachers utilizing Twitter to communicate and grow professionally is an area of interest for future research. Educators could further investigate how physical and virtual connections can empower PLCs and increase their power to assist their students. The impact of being a connected, networked educator provides many opportunities for future research as well.

Conclusion

In this section, I reflected on the strengths of the research and program evaluation. My own introspection as a scholar and change agent gave me time to critically analyze my growth through this incredible journey. The recommendations of this evaluation can help positively shift a professional learning community as they strive to make greater gains in student engagement and achievement. Finally, implications for future research were discussed through the ongoing study of the co-teaching mastery approach with pre-service teachers.

PLCs provide an incredible opportunity for teacher collaboration and reflection. The biology PLC studied in this program evaluation has a clear vision of where student learning and engagement can be stronger. Implementing the recommendations of this program evaluation can assist the team in becoming a more powerful force for change in the district and within their extended learning communities.

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Appendix A: White Paper

Program Evaluation of a High School Science Professional Learning Community

Research and Analysis

by

Rebecca McLelland-Crawley

Feb 2014

Introduction

The findings and recommendations regarding one science common planning team's approach to collaboration and curriculum implementation known as the biology professional learning community (PLC) are presented in this white paper. The overall evaluation goals focused on the overarching research questions:

1. What are the characteristics of the biology PLC?

2. How did PLC members benefit professionally from being a part of the learning team?

3. What types of products has the team created to benefit students?

The questions posed through an online survey and personal interviews to identify: the characteristics of PLCs exhibited in the biology PLC, the team-created products, and how the members are benefitting from their collaborative experience (Volker-Morris, 2004).

A program evaluation was completed to provide recommendations to the team and school as a means for better leveraging learning communities within the district. The findings and recommendations from this program evaluation support the mission of the school district to reach the whole child through 21st Century Competencies and rigorous, authentic learning experiences through thoughtful planning and collaboration among learning communities. The challenges and triumphs highlighted by participants are echoed by educators worldwide when implementing a PLC to improve student achievement.

Background

William (2007) stated, "Teacher learning communities appear to be the most effective, practical method for changing day-to-day classroom practice" (p. 39). Just like any other program implemented to improve student learning, PLC programs should be evaluated to determine if the intended outcomes are being met and to make sure they are operating as truly effective learning communities. Failure to evaluate PLCs, like any professional development initiative, can result in ineffective practices and thus decreased student success (Guskey, 2002; Muijs & Lindsay, 2008). In contrast to traditional models of teachers working in isolation, when teachers work in PLCs, the dependency cycle is broken and they are more reflective and effective in their "collective follow-up, assessment and adjustment of instruction" (Schmoker, 2006, p. 109). PLCs can serve as mechanisms for professional growth and change in schools and should be utilized and monitored by school districts as viable pathways for promoting educator inquiry focused on student success.

The implementation of PLCs in the science department at the suburban high school began after a 2008 program review of the department. Despite the recommendation, many of the teams continue to exist as common planning teams rather than true professional learning communities possessing the characteristics of (a) a focus on learning and teaching, (b) shared values and vision, (c) collaborative culture, (d) supportive and shared leadership, and (e) reflective professional inquiry (Clauset, Lick, & Murphy, 2008; Dufour, 2006; Nelson, 2009; Stoll, Bolam, McMahon, Wallace, &

Thomas, 2006; Yoon, Duncan, Lee, Scarloss & Shapley, 2007). A PLC is guided in its inquiry cycle by driving questions focused on student learning (Figure 1).

In contrast to many of the other teams, the biology team emerged as a potential PLC with a shared vision of improving student success in their course and on the New Jersey Biology Competency Test, maintains a collaborative culture, and has strong support from school leadership. This evaluation of the PLC is able to provide more information on its efficacy as a model for professional learning and a method of ensuring greater consistency in following the district curriculum through common assessments and ongoing discussion on student achievement.

Figure 1

Professional Learning Community Inquiry Cycle (adapted from Dufour et al., 2010)

What do we want
students to learn?

What will we do
if they don't learn
it or already
know it?

Review standards as a
PLC

Develop rigorous and
engaging curriculum

Generate SMART Goals
&
Common Assessments

Reflect and revise
collectively

Analyze results of
common assessments

Enact curriculum and
common assessments

How do we know if they
have learned it?
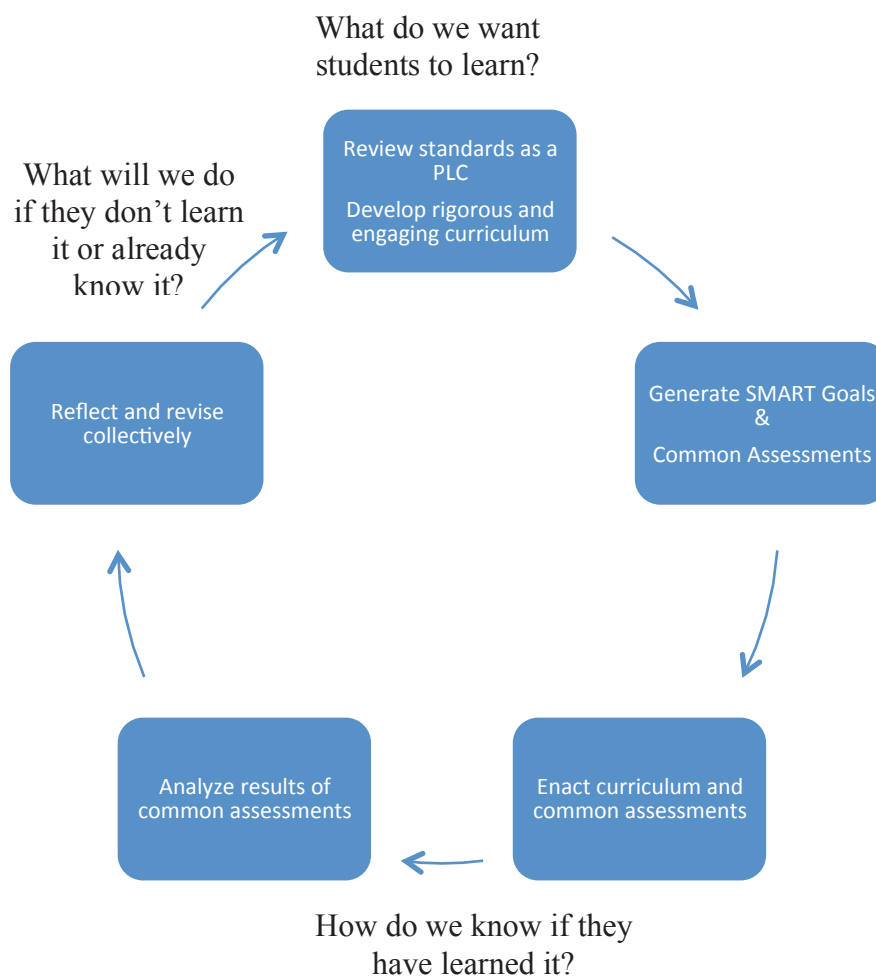
Based on the evaluation, aspects of this inquiry cycle have been addressed. The

PLC has identified the standards and written an engaging curriculum with common

assessments together. A clear vision for improving student engagement and mastery of

the content has been identified, but smaller SMART goals have not. Collective reflection

on the progress of students on their common assessments is also absent from the PLC as a

whole. PLC members highlighted some of the professional benefits including sharing ideas with colleagues and increased collaboration in a reflective learning environment.

Table 1

Summary of Survey Responses Based on PLCA-R Dimensions

Dimension	Mean Score	Standard Deviation
Shared and supportive leadership	3.09	0.52
Shared values and visions	3.11	0.50
Collective learning and application	3.13	0.54
Shared personal practice	2.79	0.57
Supportive conditions – relationships	3.07	0.65
Supportive conditions - structures	2.98	0.42

Evaluation Findings

The mean score for each overall characteristic or dimension of PLCs was calculated and represented in Table 1. The area of highest mean score based on the survey data was within collective learning and application with a mean of 3.13, followed by shared values and visions with a mean of 3.11. As a team of teachers working through a new pedagogical approach and curriculum, the data supports that the team perceives they are collaboratively working toward a shared vision to enhance student learning. According to the diagnostic and planning tools of Hipp and Huffman (2010), the findings suggested the PLC is considered implementing in this area (pp. 45-46). Within the characteristic of shared practice, the PLC scored 2.79. This was the lowest mean score

calculated from the survey. As such, the PLC could be considered in the initiating phase with respect to shared practice and suggests room for growth (Hipp & Huffman, 2010, pp. 47-48). Developing trust among all members will be essential before all of the team members begin the process of observing and learning from each other's classroom practice.

Table 2

Themes, Characteristics, and Coded Patterns of the Personal Interviews

Themes of PLCA-R	Major Characteristics	Coded Patterns
Shared and Supportive Leadership	Decisions include staff input; Shared power and responsibility for learning; Distributive leadership; Culture of trust and opportunity for innovation; Leadership support; Accountability	PLC meetings, administration monitors practices, feedback to teachers
Shared Values and Vision	Collaborative processes; Shared values, vision, norms; Focus on student learning and data to support student achievement	Student learning, mastery, engagement, achievement, grades, vision, group norms, protocols, consistency, agendas, focus on students
Collective Learning and Application	Collaborative analysis of student work; Respect for diverse ideas; Collegial relationships; Commitment to student success; Professional development on teaching and learning	Common assessments, common activities, curriculum, diversity, PLC contributions, professional development, problem-based learning
Shared Personal Practice	Peer observation; Constructive feedback; Collaborative review of student work; Coaching Shared practice and student work	Open classroom, feedback, coach, mentor, sharing, peer observations
Supportive Conditions – Relationships	Culture of trust; Recognition and celebration of success Change is embedded in culture Trusting, respectful relationships	Egos, collaboration, relationships, modes of communication, personalities, respect
Supportive Conditions - Structures	Schedule supports shared practice and planning Financial resources for development and materials	Time, embedded common planning, schedules, mobile devices, workshops

Participants indicated a need for ongoing support in the areas of problem-based learning and standards-based grading. To ensure consistency in the pedagogical approaches, continued support is essential. Teachers should be allocated time to not only meet with their peers, but also visit classrooms of demonstrated best practice. Team members should receive continued coaching on developing common and reviewing common assessments through protocols.

There is a continued need for coaching and support to help the PLC function as a team. These skills include establishing norms, developing SMART goals, facilitating meetings, and team building to establish a culture of trust. Administrators, such as principals, assistant principals, and supervisors should also be visible members of this team and speak with the same language to underscore the district's desire to have high quality learning communities.

While the biology PLC is newly established, the members have a clear vision of creating an engaging learning environment for their students. This has resulted in the creation of common assessments developed collectively with members of the team utilizing a problem-based approach. Several members of the team have sought out their own professional development through workshops on standards based grading and problem-based learning and have turn keyed this to the team. Time continues to be a barrier for teachers collaboratively planning and discussing results, thus embedding time during the daily schedule should be strongly considered. The traditional approach to teaching and learning in isolation is one that the team is moving away from and needs to be supported as they strive for more appropriate and sustainable collaboration.

Recommendation 1

Professional learning communities are one professional development tool all teachers. As this is an ongoing process, continued use of the survey will allow the team members to gauge areas of strengths and weaknesses through their growth as a team. The data collected in July 2013 can serve as a baseline and each subsequent survey will provide the team and administration talking points and a course of action for constant improvements.

Recommendation 2

While the team has identified standards for students and written curriculum together, there is still a lack of strongly articulated SMART goals. Conzemius and O'Neil (2005) coined the SMART acronym to mean: strategic and specific; measurable; attainable; results-oriented; and time bound. Continuous improvement is more likely to occur when a limited number of goals are established and a common purpose and vision are shared by all members of the PLC (Dufour, Dufour, & Eaker, 2008). The team also lacks many of the traditional structures that would help the PLC function more smoothly. It is recommended that the team spend time putting structures in place to build trust and focus for the group. As this is a newer team of individuals, team building exercises embedded in the meeting time can help the members develop the type of team work and trust that is essential in the cycle of inquiry.

Recommendation 3

The PLC requires continued coaching in the pedagogical approaches and in developing quality common assessments. The team also needs continued support with

using protocols to objectively evaluate their common assessments and the student responses. Administrators who already use protocols in assessing district common assessments could serve as a model for the team.

Recommendation 4

Time is one resource every participant referenced during their interviews. An emphasis during scheduling must be made to embed time during the contractual day for teams to meet, plan, review, and revise practices. In addition, it is recommended that the team leverages technology to make better use of their time. The biology PLC could build an online community of practice to share their ideas and allow each member to have a voice in ongoing discussions. Ultimately, the PLC should shift from that of a physically connected team to one that also collaborates virtually through a Professional Learning Networked Collaborative (PNLC) and become exponentially more powerful (Jacobs, 2009). Vehicles for increasing virtual collaboration may include tools such as Edmodo for an online discussion forum, Google Hangouts for online meetings, Twitter chats about topics related to the needs of the PLC, and Google Drive for sharing and collaborating on documents (Office of Educational Technology, 2011). Leveraging the power of a team of networked teachers will allow the PLC to learn from a vast network of connected educators and guide the types of learning necessary for educational change (Jacobs, 2009). The teachers will be able to impact the school and community through their ever-increasing personal networks.

Conclusion

As district administrators look to increase the PLC initiative, support structures must be in place. Providing both supportive leadership through participating in meetings, embedding common planning time in schedules, and providing ongoing professional development of new pedagogical approaches will ensure greater success of the biology PLC. Furthermore, the types of interactions that take place in learning communities must be supported through the continued use of norms, protocols, and SMART goals to guide all teams in their planning and appropriate collaboration.

PLCs provide an incredible opportunity for teacher collaboration and reflection. The biology PLC studied in this program evaluation has a clear vision of where student learning and engagement can be stronger. Implementing the recommendations of this program evaluation can assist the team in becoming a more powerful force for change in the district and within their extended learning communities.

Appendix B: PD Offerings at Suburban School District

Columbia Teachers College: Reading and Writing Project for Language Arts teachers
Sheltered Instruction Observation Protocol (SIOP) Training for teachers of English
Language Learners
First Year Teacher Mentor Workshops
Monthly Principal Faculty Meetings
Monthly Supervisor Department Meetings
Annual District Professional Development Conference (Choices indicated below)
A Strategy for Teaching Historical Inquiry
Astrobiology: A Different Approach to Teaching Evolution in the Classroom
Best Practices Using the Workshop Model
Building a Positive School Climate
Close Reading: Teaching and Engaging Discourse in Read Aloud and Shared Reading
Concussions in the Classroom
Data Collection in the Classroom
Examining the Impact of Privilege and Entitlement on the Education Process
Exploring Book Clubs
Flinn Online Safety Training
Fostering an exceptional classroom climate
Fostering the Traits of a 21st Century Learner in the Mathematics Classroom
Harkness in the Classroom
Harness the power of feedback!
IDE - Differentiated Training
Impact of Socioeconomic Status on Student Behavior
Implementing Biz World in the 3rd Grade Classroom
Integrating Technology into the Middle and High School Music Classes
Invent to Learn: Making, Tinkering and Engineering in the Classroom
iPad, not just for Games
Learn & Share: Utilizing the Socrative.com website and app to assess student learning
New Teacher's Technology Boot Camp:
Not Just Content: The CCSS Math Practice Standards in Action
Quick & Easy Formative Assessments
Stress Management
Tools for teaching creative intelligence
Using Google Drive for Student Created Inquiry
Writing in the Content Area
Writing Learning Objectives

Appendix C: Letter of Invitation to Participate

March 27, 2013

Dear Potential Participants:

In addition to being the Science Supervisor for our district and I am also a student researcher at Walden University. I am conducting a mixed-methods study to evaluate the 2012-2013 biology professional learning community (PLC). The purpose of this study is to (a) evaluate the effectiveness of the PLC and (b) explore the experiences of the team members and benefits gained among students and staff. I would like to invite you to participate in this study by completing a brief survey online and a personal interview that allows you to share your experiences with the program. I feel that a study of the practices of the 2012-2013 biology PLC can impact professional practice within our district. If you feel that you will not be able to provide me with candid responses based on our working relationship, I understand and it will not impact our relationship moving forward. Your participation is completely voluntary and you are not required to participate in this study.

Please note that your voluntary participation will be strictly confidential and every measure has been put in place to protect you from any harm or risk. Your feedback is an opportunity for you to share your own personal experiences with the biology professional learning community and allow you to give input on ways the program can be improved. Your feedback also allows me to share my findings with the school principal and district level members and hopefully recommend ways other learning communities can prosper from your input.

There is no obligation to take part in the study and your participation will be strictly voluntary. Please be advised that your participation will not result in any form of compensation or favor. If you are willing to participate, please complete return the informed consent form in the enclosed envelop and then complete the online survey items at https://www.sedl.org/plc/survey. The password for this survey is biology. A random 4 digit number is generated by the survey when you have answered all prompts. The purpose of the 4 digit number is to provide you with a way of withdrawing from the study, should the need arise. The number has not been recorded or attached to your name. Should you decide you need to withdraw your participation, please contact me by interoffice mail using only your four digit code and I will remove your data from the study.

No one will have access to your data other than me. The probability and magnitude of harm or discomfort anticipated during the study are not greater in and of themselves than those ordinarily encountered in daily life. I will email you in two weeks to set up a time for your personal interview.

Thank you in advance for your time and participation. Please try to complete the survey at a convenient time within the next two weeks on a computer of your choosing to ensure your data can be entered confidentially. If you have any questions regarding this study feel free to contact me.

Regards,

Rebecca McLelland-Crawley

Appendix D: Follow-up Letter of Invitation to Participate

March 27, 2013

Dear Potential Participants:

Last week, I mailed out an invitation to all of the members of the biology PLC

regarding my doctoral study. In case you did not receive the letter originally, I would like

to follow-up with information about the study. I am conducting a mixed-methods study

to evaluate the biology professional learning community (PLC). The purpose of this

study is to (a) evaluate the effectiveness of the PLC and (b) explore the experiences of the

team members and benefits gained among students and staff. I would like to invite you to

participate in this study by completing a brief survey and interview that allows you to

share your experiences with the program. I feel that a study of the practices of the 2012-

2013 biology PLC can impact professional practice within our district. If you feel that

you will not be able to provide me with candid responses based on our working

relationship, I understand and it will not impact our relationship moving forward. Your

participation is completely voluntary and you are not required to participate in this study.

Please note that your voluntary participation will be strictly confidential and every

measure has been put in place to protect you from any harm or risk. Your feedback is an

opportunity for you to share your own personal experiences with the biology professional

learning community and allow you to give input on ways the program can be improved.

Your feedback also allows me to share my findings with the school principal and district

level members and hopefully recommend ways other learning communities can prosper from your input.

There is no obligation to take part in the study and your participation will be strictly voluntary. Please be advised that your participation will not result in any form of compensation or favor. If you are willing to participate, please complete return the informed consent form in the enclosed envelop and then complete the online survey items at https://www.sedl.org/plc/survey. The password for this survey is biology. A random 4 digit number is generated by the survey when you have answered all prompts. The purpose of the 4 digit number is to provide you with a way of withdrawing from the study, should the need arise. The number has not been recorded or attached to your name. Should you decide you need to withdraw your participation, please contact me by interoffice mail using only your four digit code and I will remove your data from the study.

No one will have access to your data other than me. The probability and magnitude of harm or discomfort anticipated during the study are not greater in and of themselves than those ordinarily encountered in daily life. I will email you in two weeks to set up a time for your personal interview. Thank you in advance for your time and participation. Please try to complete the survey at a convenient time within the next two weeks on a computer of your choosing to ensure your data can be entered confidentially. If you have any questions regarding this study feel free to contact me.

Regards,

Rebecca McLelland-Crawley

Appendix E: Participant Informed Consent Form

I am conducting research through a program evaluation on professional learning communities as part of my doctoral work as a student at Walden University. You are invited to participate in a program evaluation of the biology professional learning community. You were chosen to be a participant because you are a member of the biology professional learning community. Your participation is completely voluntary and all of your responses will remain confidential. Your participation is completely voluntary. This form is part of a process known as informed consent to allow you to understand the program evaluation before you decide whether you will participate. I, Rebecca McLelland-Crawley, am the researcher who is conducting the study. I am a doctoral candidate in the Richard Riley School of Education, Teacher Leadership Program at Walden University.

Background Information:

The purpose of this study is to evaluate the biology professional learning community.

Procedures:

If you agree to be in this study, you will be asked to:

- Participate in an online survey consisting of 52 closed-ended questions.
- Participate in a personal interview approximately 30-60 minutes in length.

Confidentiality and Anonymity:

Any information you provide will be confidential. Neither survey or interview questions

will ask for your name or any other identifier such as your educational background, years

in the classroom, or gender. I will not use your information for any purposes outside of

this research project. Your privacy will be maintained by securely storing your data on a

password-protected hard drive and laptop as well as through the password-protected

survey hosting site. No one else will have access to your responses. All of your

responses destroyed after 5 years.

Voluntary Nature of the Study:

Your participation in this study is voluntary. This means that everyone will respect your

decision of whether or not you want to be in the study. No one from our school

organization will treat you differently if you decide not to be in the study. If you decide to

join the study now, you can still change your mind during the study. If you feel stressed

during the study you may stop at any time. You may skip any questions that you feel are

too personal. Your name will not be associated with this study or any publications.

Risks and Benefits of Being in the Study:

There are no anticipated risks with the process of responding to survey about the

professional learning community because all of your responses will be kept confidential.

If you elect to participate, you will be given the choice of responding to the open-ended

questions you feel more comfortable answering and withdrawing from study participation at any time during the process. Please know that you are not required to participate in this study. The probability and magnitude of harm or discomfort anticipated during the study are not greater in and of themselves than those ordinarily encountered in daily life.

The results from this study may provide recommendations to other teams initiating professional learning communities. The benefits of the study are contributing knowledge that accomplishes collaborative inquiry, fosters a collaborative culture, and results in positive outcomes on student achievement.

Compensation:

There is no compensation for being a participant of study.

Contacts and Questions:

You may ask any questions you have via phone or through email Rebecca.mclelland@waldenu.edu. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 1-800-925-3368. Walden University's IRB approval number for this study is 07-03-13-0093014 and expires on July 2, 2014**.** The researcher will give you a copy of this form to keep.

Statement of Consent:

I have read the above information and I feel I understand the study well enough to make a

decision about my involvement. By signing below, I am agreeing to the terms described above.

Printed Name of Participant

_____

Date of consent

_____

Participant's Written or Electronic* Signature

_____

Researcher's Written or Electronic* Signature

_____

Electronic signatures are regulated by the Uniform Electronic Transactions Act. Legally, an "electronic signature" can be the person's typed name, their email address, or any other identifying marker. An electronic signature is just as valid as a written signature as long as both parties have agreed to conduct the transaction electronically.

Appendix F: Letter of Requested Cooperation

August 1, 2012

Dear Assistant Superintendent of Schools,

I am requesting permission to conduct an outcome-based evaluation of the biology

professional learning community (science department) at the high school in an effort to

better understand how professional learning communities are assisting students and

teachers as my final research towards my doctoral degree at Walden University. Due to

the fact that the biology teachers have documented success within their PLC with regards

to consistent meetings and creating common assessments, I would like to evaluate their

PLC with the goal to (1) evaluate the effectiveness of the PLC and (2) explore the

experiences of the team members and benefits gained among students and staff. I intend

to collect anonymous data from the teachers using the online version of the PLCA-R

hosted by SERC that measures their perception of school and team practices related to

common characteristics of PLCs. The teachers will be asked to complete this survey on

their own time. I would also like to collect responses to open-ended questions from the

PLC members in order to gain deeper insights into the benefits the teachers have gained

based on their participation in the PLC. I will ask open-ended questions of the

participants during personal interviews. An invitation to participate in the study will be

mailed to potential participants and will include a link to the online survey and

information about the interviews. All survey responses will be returned to me through the online survey hosting site. My research will take place on my own time and not interfere with my supervisory responsibilities. This is a project designed to improve a local problem and I hope to share my data with you and the principal as an improvement plan within our district and for districts in a similar situation.

Thank you for your consideration,

Rebecca McLelland-Crawley, MSEd, NBCT

Doctoral Candidate Walden University

Appendix G: Letter of Cooperation

Dear Rebecca McLelland-Crawley,

Based on my review of your research proposal, I give permission for you to conduct the study entitled " Program Evaluation of a Professional Learning Community: High School Science." As part of this study, I authorize you to gather data from the PLC through a survey and interviews, discuss the results of your evaluation with the PLC members, and disseminate your findings to school and district administrators. Individuals' participation will be voluntary and at their own discretion.

We understand that our organization's responsibilities include providing access to the PLC members after school hours. We assume liability for any PLC program modifications should we choose to initiate them as a result of your findings. We recognize that Walden University cannot sponsor, oversee, or assume liability for any type of program or intervention. We reserve the right to withdraw from the study at any time if our circumstances change.

 I confirm that I am authorized to approve research in this setting.

I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the research team without permission from the Walden University IRB.

Walden University policy on electronic signatures: An electronic signature is just as valid as a written signature as long as both parties have agreed to conduct the transaction electronically. Electronic signatures are regulated by the Uniform Electronic Transactions Act. Electronic signatures are only valid when the signer is either (a) the sender of the email, or (b) copied on the email containing the signed document. Legally an "electronic signature" can be the person's typed name, their email address, or any other identifying marker. Walden University staff verify any electronic signatures that do not originate from a password-protected source (i.e., an email address officially on file with Walden).

Appendix H: Survey Closed-Ended Questions

Scale

1 = Strongly Disagree (SD)

2 = Disagree (D)

3 = Agree (A)

4 = Strongly Agree (SA)

Shared and Supportive Leadership

1. Staff members are consistently involved in discussing and making decisions about most school issues.

2. The principal incorporates advice from staff members to make decisions.

3. Staff members have accessibility to key information.

4. The principal is proactive and addresses areas where support is needed.

5. Opportunities are provided for staff members to initiate change.

6. The principal shares responsibility and rewards for innovative actions.

7. The principal participates democratically with staff sharing power and authority.

8. Leadership is promoted and nurtured among staff members.

9. Decision-making takes place through committees and communication across grade and subject areas.

10. Stakeholders assume shared responsibility and accountability for student learning without evidence of imposed power and authority.

11. Staff members use multiple sources of data to make decisions about teaching and learning.

Comments:

Shared Values and Vision

12. A collaborative process exists for developing a shared sense of values among staff.

13. Shared values support norms of behavior that guide decisions about teaching and learning.

14. Staff members share visions for school improvement that have an undeviating focus on student learning.

15. Decisions are made in alignment with the school's values and vision.

16. A collaborative process exists for developing a shared vision among staff.

17. School goals focus on student learning beyond test scores and grades.

18. Policies and programs are aligned to the school's vision.

19. Stakeholders are actively involved in creating high expectations that serve to increase student achievement.

19. Stakeholders are actively involved in creating high expectations that serve to increase student achievement.

20. Data are used to prioritize actions to reach a shared vision.

Comments:

Collective Learning and Application

21. Staff members work together to seek knowledge, skills and strategies and apply this new learning to their work.

22. Collegial relationships exist among staff members that reflect commitment to school improvement efforts.

23. Staff members plan and work together to search for solutions to address diverse student needs.

24. A variety of opportunities and structures exist for collective learning through open dialogue.

25. Staff members engage in dialogue that reflects a respect for diverse ideas that lead to continued inquiry.

26. Professional development focuses on teaching and learning.

27. School staff members and stakeholders learn together and apply new knowledge to solve problems.

28. School staff members are committed to programs that enhance learning.

29. Staff members collaboratively analyze multiple sources of data to assess the effectiveness of instructional practices.

30. Staff members collaboratively analyze student work to improve teaching and learning.

Comments:

Shared Personal Practice

31. Opportunities exist for staff members to observe peers and offer encouragement.

32. Staff members provide feedback to peers related to instructional practices.

33. Staff members informally share ideas and suggestions for improving student learning.

34. Staff members collaboratively review student work to share and improve instructional

practices.

35. Opportunities exist for coaching and mentoring.

36. Individuals and teams have the opportunity to apply learning and share the results

37. Staff members regularly share student work to guide overall school improvement.

Comments:

Supportive Conditions – Relationships

38. Caring relationships exist among staff and students that are built on trust and respect.

39. A culture of trust and respect exists for taking risks.

40. Outstanding achievement is recognized and celebrated regularly in our school.

41. School staff and stakeholders exhibit a sustained and unified effort to embed change

into the culture of the school.

42. Relationships among staff members support honest and respectful examination of

data to enhance teaching and learning.

Comments:

Supportive Conditions – Structures

43. Time is provided to facilitate collaborative work.

44. The school schedule promotes collective learning and shared practice.

45. Fiscal resources are available for professional development.

46. Appropriate technology and instructional materials are available to staff.

47. Resource people provide expertise and support for continuous learning.

48. The school facility is clean, attractive and inviting.

49. The proximity of grade level and department personnel allows for ease in collaborating with colleagues.

50. Communication systems promote a flow of information among staff members.

51. Communication systems promote a flow of information across the entire school community including: central office personnel, parents, and community members.

52. Data are organized and made available to provide easy access to staff members.

Comments:

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Source: Olivier, D. F., Hipp, K. K., & Huffman, J. B. (2010). Assessing and analyzing schools. In K. K. Hipp & J. B. Huffman (Eds.). Demystifying professional learning communities: Leadership at its Best. Lanham, MD: Rowman & Littlefield.

Appendix I: Interview Questions

1. What have you learned as a result of your participation in the PLC?

2. What topics are typically discussed at PLC meetings? How are the topics determined? Do the

topics of the meetings result in a final product? Please explain.

3. What have been the greatest obstacles in maintaining the PLC? If you could offer

advice to other teams trying to start a PLC, what would it be and why?

4. What types of products has the PLC created (i.e. curriculum, rubrics, common

assessments)?

5. Explain how PLCs are tied to student performance?

6. How is a PLC a reflective tool?

7. What are the goals of the PLC?

Appendix J: Interview Responses

1. What have you learned as a result of your participation in the PLC?

Respondent 1: What have I learned? How to better communicate with my colleagues. I've learned strategies, brainstorming, and collaboration on how to enact lessons and create lessons and things like that.

Respondent 2: As a result of our Biology PLC, I've learned how important it is to collaborate on a regular basis. I think as far as the importance if meeting with your colleagues, I just finished my 14th year of teaching, I think there were many years that I talked to my colleagues, but didn't meet with them. I think the PLC we had this year really highlighted the difference between talking to your colleagues and really meeting with your colleagues.

Respondent 3: I definitely learned that although we feel like we collaborate well, we definitely do have a lot of areas to learn and try to collaborate a little more specifically or to be able to have more of an agenda or to try and get things down better. I think we thought we could collaborate pretty well, but there were definitely a lot of holes this year.

Respondent 4: Being a new teacher, I learned that there are different ways to teach biology other than inquiry and that students respond to different techniques. All of the students were aware of the themes and were able to relate back to that topic.

Respondent 5: If I had to take one thing that I learned, it's that when you have an idea about some sort of lesson or activity that you want to do, it's always best to run it by

a few people before you actually go and do it because there are always other ideas that other people have that can make it better. I also always felt better about my lessons after talking about it with someone or running through a mock activity with someone. I always felt more confident with it to then present it to the kids. I learned a few things actually.

Respondent 6: What I have learned is that collaboration results in a greater end product and to me I sort of had the idea that as a teacher you are by yourself in a classroom with your students and this has completely changed my opinion in terms of you should be planning together and sharing ideas, reflecting on lessons, talking about good lessons and bad lessons, so that you all learn to do what's best for your students.

Respondent 7: I think as a student teacher it was very particularly valuable to have the level of learning from advanced teachers I had as a result of participating in the PLC so rather than saying, go teach this class, I had a chance to learn from two very experienced teachers and those learnings were very valuable in particular learning different approaches to teaching that I hadn't thought about and because of the PLC I was exposed to you know some really novel approaches maybe not, I didn't necessarily agree with everything that was being tried or discussed but I learned a lot about self-paced learning and inquiry-based learning, problem-based learning as a result of the PLC meetings. I would say that I learned how to co-create lesson plans and unit plans which is quite challenging because everyone has different approaches and different philosophies and different styles so I did learn that while its valuable to work with other teachers to create unit and lesson plans it is very challenging.

Respondent 8: That there are many, many, many topics that we don't have enough time for. For example, we would like to have more data driven discussions and things like that but being that all of us were either new to teaching or new to the building there was just too much that we tried to cover in the PLC to a point because we were trying to coordinate the PBL, we were trying to, I was trying to help them get use to being new teachers, and giving them resources. It was more about class management and where we should be going with the curriculum more than getting to that data driven and trying to, you know, use assessment to apply to what we were doing. I don't think that we were at that level yet.

Respondent 9: Well there are a lot of things, surprises, one of the biggest things that I picked up was how the different interpersonal relationships work and effect the development of a program or a curriculum. that it's not just about having good ideas but it's also knowing how to present those good ideas to different types of people it was an aspect that i honestly didn't consider before and I had a taste for it while a student teacher and completely saw happening as a maternity leave (replacement).

2. What topics are typically discussed at PLC meetings? How are the topics determined? Do the topics of the meetings result in a final product? Please explain.

Respondent 1: Anything having to do with student achievement is definitely what is discussed a lot. Problem-based learning is a topic we discuss. Lesson planning, creating activities, rubric making, evaluation of projects and problems. We also discuss the particulars like in what order should we do things. Right now, standards-based grading is something we are discussing. Basically, anything surrounding best practice and how do

we do it, what does it look like in our classroom, and things like that. We also talk about parents.

For the academic bio, that team comes up with a list of topics and I sometimes meet with them and ask them what their topics are and talk them through some of the issues they are having within those topics. The bigger role that I play is in the Honors Bio PLC and usually we do a brainstorm on the whiteboard in our prep room. If it's during the school year, it always covers what things went well, what didn't go well, where do we need to go? So we brainstorm a list what we should talk about.

Yes, most of the meetings result in products. With academic I am not sure because being I did not teach that this year, I don't know what it always looked like in practice. For Honors Bio it definitely does. We work together to create the final products and then if need be we split it in half and do some work on our own and a lot of the time it continues at night and whoever is around at night from the Honors Bio PLC use FaceTime just to hashout what the actual products are. Right now we are making Google spreadsheets of standards-based grading and that would be a product. We made graphs of student data and that's a product.

Respondent 2: Usually at the meetings we discussed with what is coming up short term and then some of our future goals just to keep us on the direction. We also spent a lot of time talking about how things are going in class. Whether it was what we did, whether it worked well or not, also how could we improve on some of those things. Whether it was a matter of revisiting those with the students we have or whether it was well the next time we do this in the future these are some things we might want to reconsider.

It was kind of a mutual collaboration as far as everyone having the ability to say these are the things we want to talk about before we walk out of here. We set ourselves a list of those things and then we would touch on those things one at a time and then if new things came up we reserved the right to take that kind of detour or we would say let's wait until we get through the list we started with. It really changes each time we meet, the agenda we had for our meetings. Many times the meetings resulted in a product, not necessarily during the meeting, but as a result of the conversations of the PLC.

Respondent 3: Whatever we were working on at the time. I know for me it was a little bit difficult because I was the only academic biology teacher that had been there the year prior who wasn't new. I had to focus in on questions about what we were covering at that time and I had a lot of questions myself, like how to formalize the curriculum and how to teach the lessons in between the projects. Sometimes we didn't end up doing that, we were talking more about the whole picture instead of the details.

Some meetings I walked away frustrated because I did not get what I needed specifically, but we did end up talking about something and then getting something done maybe that meeting or sometimes people worked on something at home. It varied from meeting to meeting as far as the level of success.

Respondent 4: Common assessments, common labs, student involvement, and performance, how they liked the different tasks. We had an agenda laid out each time and we had defined roles within the meetings, like group leader, secretary, and we all elaborated on each other's points and switched roles each time. We had the same basic

questions each time - what are we trying to get out of this lesson? What is our main goal? How can we show that they met the standard and what happens if they don't meet the standard or if they are not quite there yet?

We created common assessments. We created a common enzyme lab that resulted from our meetings. We shared ideas about different embellishments to lessons like different video clips or SMART board activities or interactive online activities that you could add.

Respondent 5: The topics were usually for what we were going to be doing the next week and the topics were determined by the curriculum and the unit we were doing, like what the goals and the objectives were for the students. That's basically how we came up with the topics - the goals and then how we were going to achieve those goals with the students through the activities we were planning.

Yes. Typically they resulted in products. Maybe not that day, but brainstorm some ideas and then I'd go home think about it and come up with the activity that we would do, and then the next day we would bring the activity to the table and see who's idea was the best or what we could add or maybe bring them altogether to form one activity or one method.

Respondent 6: OK, for us it was mostly planning and the topics we were discussing would be how to introduce the problem for problem-based learning and how to design the mastery component with lessons and activities with objectives that wouldn't require the teacher to be in front of the classroom the entire time or hardly any of the time. That was determined based on the teaching model we were implementing, so once as a PLC we decided the unit that the other student teacher and I were in charge of to

move forward with self-paced mastery we just started out with our topic and did the planning from there.

We came up with several products. The final product of the unit definitely was a result of us doing work on our own, working together and then sharing with the cooperating teachers and going through every single quest. So we would meet to discuss test schedules, administering quizzes and designing rubrics, and also we talked about how we were going to assess the students. With 2-4 of us assessing either quest reviews or lab reports or the long term investigation we wanted to make sure we were all on the same page about what our expectations were. So rubrics were definitely a product.

Respondent 7: I think the most common topics were the self-paced learning, quest system and how to make that work better based on the ongoing experience, how to address them as they came up with the self-paced learning system. I think that was the most dominant topic that was covered and I think the topics were certainly determined and prioritized by my colleagues, but the other things we discussed in the PLC meetings were the unit planning efforts of myself and another student teacher with advice from our cooperating teachers in terms of how to plan our unit and the flow of the unit and various other lesson planning. We talked a lot about what seemed to work and what seemed to not work in the self-paced quest system and we talked a lot about how to take learnings from evolution into the heredity unit that we were trying to put together. They resulted in products if the product is decisions about things to do differently, then I would say we made progress there. They didn't always result in a final product as in a certain decision.

Sometimes I feel like the meetings got off topic and were not always focused, many times they were, other times they sort of went on tangents.

   Respondent 8: Most of the time, there was an agenda beforehand, but usually we would try to deal with problems that were at hand. Most of the time we would try to discuss the norms at first, you know, remember to do this, that and the other thing, I would have to bring the norms up on the Google Doc and we would discuss where we were going with the curriculum, how we were planning to approach it, most of us were in agreement with the different activities we were doing, that we should make a common assessment, and different issues like that and that was what was discussed at most of our PLCs. I guess it was less as a final product, but more that we were more coordinated as a group in what we were doing. It was more behavioral than as a product. If we were doing a product, it would be more of how we were presenting our classes and what was a better way to present our classes and we worked together like if somebody had a good activity we would bring that into the group, discuss what we were trying to do with that activity and then maybe use this, that or the other thing.

      Respondent 9: well the topics were mostly determined on a need to be determined basis whatever was needing to get done as it was a new approach there wasn't as much planning ahead like a week or two in advance, it was mostly what we were going to do this week and was a need to do basis so there wasn't much discussion as in what we were going to talk about three weeks from now it was a discussion on what we were going to do this week and maybe talk about would lead into the next and that's how the topics

were approached by what needed to get done now. There wasn't much to fall back on as it was a new program.

Yes, I would say those topics did result in a final product. The creation of completely new activities from nothing, new lesson types, new discussion models, new you could say thought inducing questions, new settings for problem solving that you know came from scratch so they did develop coherent final products.

3. What have been the greatest obstacles in maintaining the PLC? If you could offer advice to other teams trying to start a PLC, what would it be and why?

Respondent 1: Communication for sure, but most of all time. Having the time to meet is that hardest thing. I don't have common planning time with the academic team. Most of the time they meet at lunch, at North they meet at lunch on an A day, that was the only day that I didn't have lab during lunch so it was hard for me to meet with them because of the timing. The Honors PLC had common planning time and that's why we were so successful in implementing all of our goals because we had that common planning time and we also FaceTime at night. We just have to make time. It's not about us, it's for the kids. We had to put other things aside and do what's best for the kids. Timing, dedication, trying to overcome personality differences can be difficult. In addition, sometimes working with, I don't want to say a revolving door of people, but working with a leave replacement, somebody coming in, somebody who was only coming in without a lot of pedagogical experience, so it is hard with people who are not

vested in the long-term achievement of the biology department and students within it.
That can be quite difficult as well.

Some advice I would give would be to start small. Don't try to make the PLC really big
with too many people and too many personalities. I would suggest starting it with a small
group of people you already have a collegial relationship with that you trust that will be
honest with you, but that you are not sensitive to what they might say. It is hard, you
work hard at something and the members of the PLC are like I don't know if this is what
we want and it has to be a group decision so you kind of have to make sure you have that
relationship with people. Start small. Start with a close group of people. Try to find the
time even if you don't get the time, even if it is once a week after school or whenever.
Make the time and stick to it. One of the things that worked for us - we just said it's PLC
today and we all we always new that our prep period in the afternoon was for the PLC
and sometimes if we had something to do we would always say this comes first and
foremost. This was our time to do it. Find a particular time and make sure you stick to it.
Another thing would be to make sure you have a goal or a vision for the PLC. You don't
want it to be a bitch-fest about your colleagues or your boss or students or parents or
whatever. Go it with the goal that you want to accomplish and work towards that.

Respondent 2: Life (has been a great obstacle). Committing yourself to meeting on a
regular basis, which we literally were meeting every single day during our prep periods
because it worked out that way for us. Committing to that time frame. My wife joked that
she doesn't see me anymore. What she meant was that I was not coming home for lunch,
because I live very close and would go home. If I had a lab at the beginning of lunch that

pushed me into the next period, so I would stay home for 45 minutes to an hour. That would eat up most of that prep period after lunch. Knowing that I was going to meet with the PLC, I wasn't going home for lunch. I was staying here and I was getting ready to do that. I was committed to doing that and knowing that I couldn't just run out and do things. Or I couldn't grade papers, or I couldn't do those kinds of things, that was the hardest thing because those things sometimes take priority. You know, oh my god I have to run down and talk to the principal about students, I have to do it, but this is our PLC time. You know give me 15 minutes and then I'll try to get there. So that was the hardest part.

Stick with it. Definitely stick with it, because even though it's one of those things you don't realize you have things to talk about, you always have things to talk about. I think that's one of the things that my colleague and I were talking about the other day, that even when we pretty much have a good direction on where things are going, we start talking and an hour later we say, oh boy I didn't think we had a lot to talk about today, but we really did. That's the thing I would definitely say. Stick with it. Commit to it.

Respondent 3: I think everybody's different opinions. There are too many cooks in the kitchen, not only the bio teachers at one school, but all schools, and trying to get everybody on the same page. That's the hardest thing. You are never going to get everybody on the same page, but trying to get some consistency between all the teachers.

Go into your meetings with a plan, don't just try to wing it. We tried to do that and realized it doesn't work especially with so many people. Have a written out agenda and email it to everybody as to this is what we are going to be talking about, these are the things people want to get done and we need to really need to stick to them.

Respondent 4: I would say I would like to have a larger group, it was just three teachers in our group. I liked what the student teachers and cooperating teachers were doing, but it felt like we didn't get enough interaction time with them to understand their approach, even though they were honors. I think the hardest part was we were all just starting out and we were trying to get the ground work done for our PLC.

I would say keep the same basic group, but have some other teachers from other areas of the same topic come in maybe one per week or one per month and get their views on how it could improve. You could show them your strategy or your technique.

Respondent 5: Probably the schedule. It wasn't too much of a problem because the student teachers and cooperating teachers had the same schedule, but I know other people wanted to come into our PLC and work with us and it was really difficult scheduling when people had free periods and some people can't stay after school and then we would move on and they would never be able to see what we were doing or contribute to what we were doing and we weren't able to discuss with them the way that we wanted to just because of scheduling. I really think that was the biggest challenge with it. (New PLCs should) try to make time, even if it is only 20 minutes at the end of the day to maybe come up with a to do list and then go home and brainstorm on your own and the next day come in and talk about it. Try to make time if you can to sit down with each other.

Respondent 6: I would say during the school year it was frustration. The other student teacher and I, we were not very similar. My co-op teacher and I have the most in common in terms of being on top of things with A type personalities. The other student teacher and I did too, but, we never really clicked and sometimes we just wanted to go off

on our own to do stuff, but we couldn't because there was joint aspect and that was definitely an obstacle in maintaining the desire to be a part of the PLC. Collaboration isn't always easy even when you have common planning time, but I think I have overcome that a little bit.

Other teams should let go of control. Also, I think in a situation, ours was very unique because we had no choice, but to do the same thing. Whereas a PLC can come together, sit, share, plan, make some lesson plans, or unit problems, and unless they are common assessments, you can take that idea, tweak it on your own, and also should remember this is common planning, and unless it's a common assessment, you are not required to buy into everything it's just a place for sharing ideas and planning together.

Respondent 7: I really liked it. I think at times it was kind of too much. It was kind of like the time I wasn't teaching was all PLC so it wasn't just one meeting, it was kind of like the rest of the time was PLC. At times it was too much and kept me from doing my own things like do the grading, do lesson planning, because it was like when class was over, the cooperating teachers would say let's go to the PLC. So it kind of took up all the rest of the time and I would say maybe it should be a little less extensive and maybe start off a little smaller because I think people as teachers need their own individual time to do some of the other things they need to do during the day. The suggestion was made that I could do all of that at night, which was OK, but I would also would have liked to have gotten my own stuff done during the course of the day. So I would say that maybe it should be at a smaller scale and maybe it could be one period each day or one period every other day as opposed to all of the periods where you are not teaching. The other

thing that should be considered is how conflicting philosophies and conflicting styles within a PLC should be handled because in our particular PLC there were two student teachers with very different styles and one based on my perspective one of those styles was possibly valued a little bit more than the other and I felt like in some of the meetings and in some cases the leaders of the PLC allowed one student teacher to dominate over the other in terms of the philosophy and how to do things so I think that whoever sort of, I think within a PLC you have to have a leader, and you have to have a leader, and this is all my perspective, the leader has to bring in someone on the team when they are not entirely respecting the value of different viewpoints of other people on the PLC.

Respondent 8: Well, toward the end it was that 2 of the people were leaving so they were less motivated to taking part in the PLC. Not only that there were certain agenda items that we really needed to get through, being that none of us had the old material, such as the final exam, it took a little time so you now but we knew we didn't have the final exam we'd postpone it and if we didn't get back to it, that was a problem because you know we finally did get it and go over it, but I did a lot of the final exam when we were not able to meet and again that was toward the end of the year when the two other members of my PLC were leaving.

Go in with an open mind and with energy. PLCs can be a very positive place. You can share ideas, get that feedback that people need, it could be a very good experience if you are motivated to do so and you have to be motivated. If you are really in it for the kids, this will help and you know, one thing about teaching is you are never perfect, it has to continually evolve and a PLC will help you do that because you are getting ideas from

other places, it helps sometimes to get energized through the feedback from the people

but you really have to want to do it because there are so many other things that can pull

you from place to place.

Respondent 9: Obstacles and advice to offer teams? It would be that commitment that

time commitment that you need. I saw more as a student teacher where myself and my co

student teacher would have to stay here until every day on a daily basis we came here at

6:10-6:20 and didn't leave here until 6pm, 7 sometimes even 8 and not only because the

ideas needed to be streamlined but the papers themselves needed to be produced and

everything so those worksheets needed to be created, sometimes they were created from

scratch, activities needed to be completely created from scratch. and it was really a lot of

what are we doing tomorrow? what do we need to get done? so that time commitment

that was required to develop them wasn't just limited to the prep times or an hour after

school, it really does require full time involvement of the entire 12 hour or 18 hour day at

least at the very beginning of the program once it's developed I'm assuming that it would

probably take less time but something to be created from scratch will take that time but

you have to come in with the idea that it will take that time.

4. What types of products has the PLC created (i.e. curriculum, rubrics, common assessments)?

Respondent 1: For example right now we are working on standards-based grading so

one of the goals our PLC has is it wants to toward is degrading the classroom. So we

meet and we do research on what standards based grading even if we try to find some

others who have done it before and then we just start working on it. We use Google docs

because that's our preferred method for collaboration because it's real-time and we can both be working on it simultaneously. I took the questions part of it, my colleague took the formatting part of it, and then we reach out about what we liked or didn't like and we make it work. We're also working on common assessments so we meet to brainstorm ideas on how to assess our students on the enduring understandings. One example for academic bio is the students are submitting an idea to Myth Busters and the idea has to be biology or science related because it is part of the science as a process unit and so the first part is they have to create on paper what it is, a hypothesis, how they would handle the procedure, and all of that and the second part is they have to craft a letter with the information to Myth Buster under the criteria that we have for them. We just try to brainstorm authentic audiences and activities that could really fall under problem solving under each unit using 21st century competencies and the enduring understandings. That can be quite difficult because sometimes members of the PLC just want it to be easy, you know multiple choice test and things like that, but we all try to veer away from that to see if our students get the information and can thinking critically about it. The rubrics, that is another part of our work. We create the rubrics to get at problem solving. Our students create their own rubrics for collaboration and things like that and how science runs which we use to evaluate them and they evaluate each other. We do a lot with that to make sure it is coherent. A lot of brainstorming of ideas goes on in the PLC for sure.

Respondent 2: Sometimes the products were as simple as do now for the beginning of the period that were going to be, here's what we are going to do, here's what we expect from them, to as elaborate as problems and the activities and the artifacts that would go

along with them. We created labs from scratch or were using information that we currently had and then manipulated them to work within the context of what we were doing in class, for example the zombie lab was something we came up with. The zombie lab was a bridge between populations and population growth and evolution. It was basically taking a look at populations, in this case zombies, and what factors would affect their growth so they played a role playing game. At the back-end of that, we used it as an extension of now the zombies have taken over and humans are the minority, what are some of the things that have allowed the populations or individual groups of humans to survive where they are? What kind of traits do they have which have allowed for their survival that the zombies couldn't get to them? That was a pretty involved activity and was the topic of discussion at our PLC meetings for that period of time. Also other things like creating games to represent energy flow and matter cycling in an ecosystem and that was a topic of discussion for many of the PLC meetings as well. It is not just creating the activity. It is trying to get them (the students) to create their game. That is almost harder than doing it yourself.

Respondent 3: We created the curriculum over the summer. The first unit of matter and energy we created individual assessments where the kids would create a brochure or a Facebook page about their biome. Then in the second unit, which was interdependence, the groups came up with a tri-board to explain what would happen if tourism came to their biome. The last unit I was involved in, the kids came up with their own story book about a particular animal or plant and how it could evolve.

The goal was to have everyone doing common projects. We did end up coming up with assessment items besides the projects. The first unit was something related to the specific biomes. The second unit was an article that they read and had questions related to the topic. It could have been about global warming. The third one, the kids had to read the story books and then evaluate them. It is almost two part, two common assessments. Because some of them were in groups and not individual, we wanted to come up with a way to test them individually too. It wasn't a multiple choice test.

Respondent 4: When we did the written responses in the common assessments, we had rubrics that we created for their responses. We had these rubrics that were already created for us by other teachers, but we added on to them and we thought that going into the next year, as in this summer, we needed to work on the rubrics for the tasks.

Respondent 5: The other student teacher and I almost had our own little PLC, like a sub PLC within our PLC. We would come up with the rubrics mostly and then the cooperating teachers would look over it and add anything if they needed to, but that wasn't what we really worked on. There was more activities that we did with the students or labs that we were setting up. That's more or less the products we developed.

Respondent 6: We worked on the evolution quest and one of the big problem was the backlog with students being ready and waiting around to be quested. We decided to sit down and asked ourselves how can we order this so that if they go on to the next one it would be ok. We tried to make them larger components with the readings, the video and the worksheet rather than as separate things, so we could review the student without actually having to sit down with them for 10 minutes. We talked about how we would

assess them, what were the expectations for each part, and what demonstrated mastery from things they have to hit on. I know specifically from the DNA test, the questions about the lagging strand and the leading strand, and I would send them back and say this is a big thing you've got to understand, let's try to refocus this and go back.

We also tried to figure out how to make the activities more inquiry based rather than do this, to try this even though you don't know how, and find the solution yourself, and learn meiosis through karyotype, learn law of independent assortment by doing dragon genetics simulation.

Respondent 7: We as a PLC created quiz assessments together and that was great because the student teachers benefitted from having the senior teachers help us with those sharing the quizzes. We also generated quests, the actual quest elements within the PLC and it was very often was very valuable to have all four of us weighing in on the value of a particular quest in terms of assessing the objectives. We generated most of the quests in the PLC. Rubrics we didn't particularly generate in the PLC meetings. We did go through quest by quest, another student teacher and I would go through the quests and then in the PLC meetings we would discuss those ideas and get feedback from the cooperating teachers that were valuable and we would make final decisions on which quest we should include in the PLC meetings.

Respondent 8: We came up with, we basically took the PLB, which wasn't quite complete and got it to a place where it was a little more complete even though it wasn't written down, which is something I am planning on doing this summer, I think it is a lot more fleshed out than shows in the curriculum document right now and that's something

that I would like to be considered certainly part of that product. Not only that, we did a couple of common assessments that we did, even though I am not happy with them, you know, the common assessments were given. Me: What about the common assessments would you change?

I would have liked for them to have been more thought out. A lot of times we didn't even know like for example we didn't even know there was supposed to be a common assessment and then you kind of threw it out last minute and like I said I would like them to be more planned out than they were. Were we able to pull it together? Sure, but it needs to have more time spent on it which we are doing the first half of the year now.

Respondent 9: One of the first things we developed were thought introducing activities where we developed activities in a way not with the full idea of what we wanted to teach them but with a half idea that would go to the students for them to complete for themselves to bring their half to the table for example, the energy transfer/nutrient cycle game which was 80% what we wanted them to know and they had to complete the other 20. Where they have to look at the aspects of the game and develop them. Other ones for example were the deer population game to create different s curves or population crashes where they themselves had to create equations or solutions to solve these problems or the barnegat bay example where they had to give us what they wanted to know or what they would like to know in order to solve it and we only gave them basic ideas and they had to take it and develop it to get to the final answer and that one was probably the most challenging ones because you needed to know what they wanted and you had to create

and develop it for the next day so you really were at the mercy of what they wanted to do so you had to be really good at anticipating what some of the things your students will say in developing the anticipation really makes or breaks the entire developed in the the PLC

5. Explain how PLCs are tied to student performance?

Respondent 1: Well the big focus in our PLC is on student performance. With everything we do, that is our end goal. When we talk about how the lesson went, if it went well, if it didn't, it's not about I talked too much or it totally bombed, it's about the student outcomes. So most of the time it's based on formative assessments and talking with them and trying to enact something and so we have to sit down and say based on the conversations with students, they are just not getting it or looking at the formative assessments, the feedback they are giving us is that they don't understand this concept, or that they do and they are beyond it. Then we have the conversations around, not that we have to reteach something per se, but that we build it into a continuum of how we teach in the classroom so when we have conversations about evolution, and we are moving on, we can still incorporate those discussions into another unit so that they can see it from a different perspective. That is how we govern our lesson planning based on student achievement and based on the feedback from the PLC.

We had a lot to do with problem based learning and the student outcomes were directly linked to that and also just how we think about education is a big part of our PLC and that is based on student achievement by looking at achievement gaps. Something that came out of our PLC was looking at honors, as in getting a stamp of honors versus taking

a course of honors. Our students might not be ready for that level of thinking and we need to take that into consideration and sort of taking points away and learning, learning objectives, and focusing in on what's important. Those are how our PLC is focused on student achievement.

Respondent 2: The PLCs are tied to student performance both informally and formally. We would take a look, like I said there is a portion of our PLC that discusses our expectations of the students and how do we expect them to respond to certain things and what we hope their responses will be. Then afterwards we look at how they performed. Whether that be informally looking at it based on well you know when I did it this way and my questioning was this way, they didn't really respond the way I hoped and they weren't getting to the goal that I had laid out for them. Or it could be formally by looking at their responses to the questions. We sat down and looked at their responses to questions that we've created and we would review them to try and figure out if that was a misunderstanding, if they were getting it, if they weren't getting it, and we would share those with the group. That was definitely within the honors, but within the academic group there was not the same level of formality. There were conversations of oh I had this happen today, but not as much as let me compare my answers to yours or let's take a random one and see how we feel about this.

Respondent 3: Anytime you have a time to collaborate with coworkers and try to come up with lessons and come up with curriculum that you think can work to try to better improve your students' performances, I think that it's a good thing. I am a firm believer in collaboration. I would rather work with other people than try to come up with lessons by

myself. I can do it, but I think lessons that are collaborated on are so much more effective

and try to reach different capacities for kids that you might not think of on your own.

Respondent 4: According to the results from our common assessments, they were pretty

much common results from the students. We were able to see that the approach had the

same basic affect on all of the classrooms, grade wise and performance wise. We could

see which tasks the students liked and which ones they didn't like. We would talk about

the tasks and how we could change it.

Respondent 5: I'd like to think that since we had a PLC that our students

succeeded more with our PLC than they would have if we didn't have this PLC. I think

we were especially more organized, knew exactly what objectives we wanted students to

have. Everything that we had was essentially better because we had the PLC so I think

they succeeded more. If we saw that if we gave an assessment and we didn't get the

results we wanted to, we would brainstorm different ideas to maybe go back to one of the

objectives the students didn't meet and we would brainstorm "ok, what can we do to get

more of our students to meet the objective moving forward?" and we would go back a

little bit to see what we could do.

Respondent 6: This is where I don't have an answer and when I did the survey I thought

we were lacking on the sit down and look at assessment data just because it was our first

time doing this. I wasn't there at the end of the year so I have no idea what the

cooperating teachers looked at to sort of change for the last unit, but I have not seen a

change in student performance based on the PLC I seen how teachers, especially new

teachers can get good ideas and be more prepared and realize they have a support system

to fall back on.

We would talk about test and quiz questions that seemed ambiguous and we would

realize that. We would also talk about quests that some students didn't understand or one

set of results came in with misconceptions about haploids and meiosis so I would know

to look for that when I assessed my students during quest reviews. I never saw numbers,

but it was more about how to assess them. I know the cooperating teacher did his final

chart comparing grade distributions and that would be interesting to look at comparing

students in traditional, non problem-based, non-mastery bio who tool a test on genetics

versus students who did it in a problem-based, mastery approach.

Respondent 7: I don't have enough experience and data to go on, but mean I can only

guess that students would benefit from having the viewpoints of not just one teacher, but

4 teachers perspective in the learning activities and the assessments. My guess is that

students can only benefit from having the ideas of four teachers going into their education

as opposed to one writing in isolation.

Respondent 8: Basically, PLCs can be tied to student performance in that if you are

analyzing what your students are doing you realize what their strengths and weaknesses

are you can check the commonalities between the different teachers and the different

classes and then between all of you can come up with, I don't want to say remedy,

strategy to help the students improve. You really do need to, we as teachers are social

animals, and really need the input from our colleagues. But if you are having a PLC it

should be a mixed group. It should have more experienced, less experienced, somewhere

in the middle, it's got to be heterogeneous it cannot be all new, all old, it's got to be a mix.

Respondent 9: Well it gives you a new approach of how to measure student performance, you know with more people it is easier to develop more in-depth analysis and in-depth you could say assessments to have to develop student performance when by yourself it is a lot harder to grasp the whole idea but when working with a PLC you get different ideas and different types of evaluations and maybe consider different things you haven't considered before so now you are mostly what do I want to get at the end of my lesson and evaluate based on those basis and little things that you thought were necessary are not important compared to the big idea "what is it that we want to get out of this?"

6. How is a PLC a reflective tool?

Respondent 1: By going to these meetings and sitting down with the PLC, the first thing you want to do is talk about what's going on in your classroom. I think there is this natural ability to say this is what I did, this is what I want to do. You naturally tend to reflect on what is going on. Instead of just doing your lesson, closing the door, locking up and going home, you are forced to talk about, especially when it comes to student data, is it working and what can we do to get this to work? It definitely lends itself to it. When you are talking to someone, it's all about talking, so that lends itself to reflection, instead of working in isolation. Although I have done that before, and said oh that didn't really work, and I would put post-its on the assignment and the next year would revisit it and say oh yeah I wrote this, but I don't really know why and I don't have time to change it. Having daily conversations forces you to constantly talk about what is going on in your

classroom and when you run into a roadblock, it forces you to think about what you are doing. For example, in our honors group we reflected so much that we even changed the way we thought about teaching in a classroom to move from giving grades, to not giving grades toward a standards-based form of grading, to how we communicate with parents. We met constantly to think about how we could improve it.

Respondent 2: It forces you to look back at what you did and the responses you were given, as opposed to what am I going to do tomorrow, it forces you to see what did I do today that is going to affect tomorrow. It is not just let me plan for the future, it is getting feedback for what you have gotten and then tailoring what you are going to do moving forward based on that feedback. As a reflective tool for practice, you can use it to see for delivery method, how it worked, how the kids received it. As far as your own teaching, it forces you to think how could I have done that better or what is it that I did well to make sure I keep doing it.

Respondent 3: It definitely makes you think about what you are doing. You can come up with your own lessons and think you are doing great stuff, but it isn't until you work with someone else that you really reflect. You can reflect individually and think how do I think this worked? Do I like the way I did this lesson? When you pull someone else in, they ask why you are doing that, what did that do for you, what did that do for the students. What about this idea? It really does make you reflect a lot more than if you were alone.

Respondent 4: Your own practice is looked at and reflected on the best practices of people outside of your PLC and even within your PLC. Making all of the tasks common you have to think about how will I teach this now and how have I normally taught it.

Respondent 5: We would actually do a lot of that because I would have someone asking me, "what would you have done netter in this lesson?" So someone was forcing me to look back on what we did and I think if it was just me I probably wouldn't do that. They forced me to think about how the lesson ran and to verbally talk about it with them and then they would give me their input on what they did and maybe they changed something up and I would think of that as a good idea and say alright let's do that next time and a PLC definitely forces you to reflect on your lessons more than if you were just by yourself. Observing the other teachers I was able to see that everyone teaches a little differently, they put their own spin on things that we didn't even think about, like adding something in on the fly or asking different questions. It definitely gave me insight and tips on what I would do differently if I were to teach that lesson again.

Respondent 6: For me, it's reflective in two ways. It helped me examine and question what I want my role to be as a teacher and that out of it I don't want to be the teacher who lectures. It also made me reflect on how I may be difficult to work with. What I see as my strengths as being organized and always having a plan can be sort of aggressive to other people or controlling to other people. And then, as a tool for teachers in general it is a really great way to sit down and talk about the things that went wrong the thing is to learn as much from that as much as things that go well and you are able to say good advice for other teachers to be able to fix that.

Respondent 7: It really gave, particularly for the student teacher point of view, it really gave the student teachers a way to bounce ideas off more senior teachers and that was very invaluable and we didn't have to go hunting around because we had them who were always there. The PLC allowed me to reflect on how well I was doing and maybe at times when I wasn't doing so well. It allowed me to reflect on the value of working with every teacher and the challenges of working with other teachers who have different styles and different ways of doing things so it was very valuable in that we could receive constant feedback on our planning. It was also valuable to get that experience of working together with other teachers and not be in isolation.

Respondent 8: You are going back and thinking about what you did in your classroom what did and didn't work. You are thinking about how the students reacted to it and that in all is reflection. Any time you go back to analyze pros and cons what worked and what didn't that's all reflection and if you are doing it to say I could have done this better and why, again, that's what reflection is.

Respondent 9: Well the input you receive from your colleagues really is an eye opener sometimes because sometimes you don't even working by yourself or developing things by yourself you don't have the time to reflect what you develop or what you have done or the reflection time is minimal. Working with others allows them to see you in a different light to see you in a different perspective and to give you their analysis from their perspective which can give you a whole new way of seeing how you develop and how you carry out your lessons. I had teachers coming in, it was the idea of an open classroom, anyone who wanted to come in came in to sit, to observe, to give input at any

moment, if they feel like joining in for an idea that they felt like they contributed, they could and it was that sense of collective reflection. I had three observations on one single day.

7. What are the goals of the PLC?

Respondent 1: That's a good question. I'd love to hear what other people have said because I don't think we have any definitive goals that we hang on our door that we always look at. Some ones, for example in our curriculum writing is to create common assessments that hit on the learning objective and enduring understandings, and not just hit on rote memorization. That is sort of the goal of the academic biology PLC that I am working with now. For honors, we have a lot, but mostly it is how do we enact more progressive ways of looking at education strategies. A goal is to de-grade our classroom. Another goal is to flip the communication from parents and teacher to student and parent. Another goal is to move our role to more of facilitators and co-creators of knowledge rather than the traditional teacher format.

The PLC that I value the most is one that happened kind of accidentally. I wanted to share that. I have been working with a colleague of mine for many years and teaching the same class and it was always business as usual until we had the freak occurrence where we wound up having a common schedule with planning time and other members with our pre-service teachers, something emerged from it that was far beyond anything I could have imagined. I thought when we started meeting, we would be spending a lot of time with just planning out administrative duties with our pre-service teachers, but then it

clearly changed the way we think about education. To me that has been the most amazing thing that has come out of this PLC.

Respondent 2: The goals of the PLC are just that, 1) to get diverse opinions or ideas of a particular problem and trying things you wouldn't try if you were alone, and to support others. It is also to highlight your practice, delivery method, feedback and evaluation, how we do these things and what affect they have on student learning.

Most of my responses are about the formal PLC where we said we are going to commit to this and do this every single day. As a result of that, the PLC "spidered" into other types PLCs that were breakouts of the major PLC which started as the Honors Bio PLC. We had other ones which were on methods, where it wasn't just biology teachers, but Biology, Chemistry, and Physics teachers. It wasn't meeting as often or as regularly, but it demonstrated that those individuals had a common goal or purpose and wanted to discuss that. I think that one strong PLC can give rise to these off-branching PLCs that are beneficial as well.

Respondent 3: We really wanted to try to change the ways students learn. We did labs and activities and things like that but we were finding that in this day and age, in the digital world, kids can just find that information. We really wanted to change the way they learn by making them think and use the digital information that they could just find out instead of learning through us and then apply it. We had hoped that the PLC and each of the projects would gets kids to think and to learn on their own and with the guidance of us instead of us just telling them the information.

Respondent 4: Each time we met we went over in that we talked about helping students succeed and what happens if one student behind the pack or ahead of the pack how can we help everyone learn differentiated but still with the same tasks?

Respondent 5: Goals for our PLC were to be open with each other and to be able to give criticism on ideas we had. One of our goals was to be open-minded and not to be afraid to share our ideas and don't be afraid that someone would shut it down. I think one of our goals, I don't think it was verbalized, since we were working together it modeled what we wanted our students to be doing because they work together a lot in teams. I think us modeling our PLC came through to the students as well when they were working in their group. I think that was a behind the scenes type of goal we had for them.

Respondent 6: I think the goal was to modernize the way we teach biology. What's important isn't about memorization and just content, or is it about learning content through themes, but also paying attention to the process of learning, because in the long run are all the students going to be biologists? Probably not, but if we can help them in future science classes and future classes as well, I feel like that is a really big benefit.

I think common planning time was really a huge benefit. We wouldn't have been able to do that, at least the other student teacher and I would not. I know the cooperating teachers said to do FaceTime, but we didn't really have that kind of relationship to do that. If we didn't have that in school time, with having kids and having class, it is asking teachers a lot to do this common planning, but not give them time during the 7 hour school day to do it. You don't necessarily need to have teachers that are same-minded, but maybe open-minded. Having teachers that don't want to try new things is not going to be productive

because that's the teacher who wants to do their own thing in their room and is alone in their classroom with their students and that's it.

Respondent 7: My perspective in speaking with the cooperating teachers was to have consistency between the different sections in honors biology, I think that perhaps one of the goals. So that when the other student teacher and I were teaching it was consistent across the sections. I think one of the goals was to share best practices, which was definitely the case in the PLC. I think to get constant feedback on what you are doing was probably a goal. In having PLCs the feedback is always there. there is time or it. I think that's a really good thing, not just for student teachers, but for the more senior teachers. It forces us to take time to help each other out. Unless there is time set aside for a PLC meeting, there isn't time set aside for that kind of interaction. The PLC forces that kind of interaction to happen and I think that's a good thing. I don't know if these were really the goals of the PLC, that's just my perspective on it.

Respondent 8: I think we listed them on our Google Doc and that was to get the students to perform well in class and in standardized tests, to build community in the group of students in the class, and I can't remember what the other one was. I am pretty sure it is on the doc. I know that we did it as a group on the doc as an academic, larger PLC and that is on the doc.

I do believe they work well when the people are motivated and I think the groups in this district are more motivated than most. I would like to continue and see how it works out because I think that these actually could be a model for other districts. I am interested to see how this is going to evolve.

Respondent 9: The over goal was to establish the procedures on how to work the PLC. How would you approach it, how would you address what needs to get done, then develop a plan of attack on what needs to get done, and then come back and reflect on it and make appropriate changes for the next time. So it was really streamlined in the process on how is it that we are going to attack this new curriculum and how are we going to develop lessons in the future or co-develop lessons.

Is there anything else you would like to share about your experiences?

Respondent 1: The PLC that I value the most is one that happened kind of accidentally. I wanted to share that. I have been working with a colleague of mine for many years and teaching the same class and it was always business as usual until we had the freak occurrence where we wound up having a common schedule with planning time and other members with our pre-service teachers, something emerged from it that was far beyond anything I could have imagined. I thought when we started meeting, we would be spending a lot of time with just planning out administrative duties with our pre-service teachers, but then it clearly changed the way we think about education. To me that has been the most amazing thing that has come out of this PLC.

Respondent 2: Most of my responses are about the formal PLC where we said we are going to commit to this and do this every single day. As a result of that, the PLC "spidered" into other types PLCs that were breakouts of the major PLC which started as the Honors Bio PLC. We had other ones which were on methods, where it wasn't just Biology teachers, but Biology, Chemistry, and Physics teachers. It wasn't meeting as often or as regularly, but it demonstrated that those individuals had a common goal or

purpose and wanted to discuss that. I think that one strong PLC can give rise to these off-branching PLCs that are beneficial as well.

Respondent 3: For me it was frustrating because I don't totally know what PBL is, I get the theory of it, but I guess I don't fully understand how to teach it because unfortunately we came up with the projects and five themes, but that's where the time got cut. When it came time for what we were going to do next, we tried to figure out a plan of what we were going to teach in between. We didn't get to that. When I came in September, and losing people I worked with in the past and having new people, I kind of felt lost and I didn't feel like I really executed the PBL properly. I tried my best on not to do the formal lecture and the way that we had done in the past, but I know that I didn't do PBL the right way. So I guess for me, I needed to learn a little bit more or try to work with somebody who does know how to do it so I can execute it better because I know I didn't do it the right way. I think everyone that was doing it for the first time last year on some level they didn't totally know how to do it. There were projects at the end, but what do I do in between? I'm sure a lot of people on the team were just doing labs and activities they had done in the past because that is their comfort zone. They didn't really know how to execute it, I know I felt like that. I would definitely be open to a workshop or seeing if there were other teachers who know how to do it. I would love to go and be able to educate myself on how to do it.

Respondent 4: Everyone was professional to work with and no one whined about doing PLCs and we benefited from it, I know I did anyway. It seems like everybody liked it and

I would do it again but I would mix it with other teachers. The academic bio team one

day per cycle on A days at lunch. We would all eat together and it was fine.

Respondent 5: NONE

Respondent 6: I think it a fantastic idea. I think perhaps start a little bit smaller, as I

mentioned before, teachers have to have time to think alone too. I think that is important

so the PLC does not dominate all of your free time. I would also say that the leader of the

PLC has to find ways to make sure that one member of the team doesn't run rough shot

over another and I think that could happen in teams, but it is the job of the leadership to

make sure that it doesn't happen or if it does that it gets reigned in. Don't take it the

wrong way because my experience was very positive and very valued, and I learned so

much from the three others. When certain personalities are involved on the team, there

has to be some type of mediation by someone. Overall, my opinion is that we worked

very effectively, but there were a few times that there were a few minor conflicts, but I

think maybe having some norms would help. Giving norms especially for people,

especially for people who are not used to working with teams, for how to behave and

how to bring up problems and address problems. I think having a set of norms for the

team could be helpful right upfront as these are the rules of engagement for the PLC. I

think that would be useful. I think once the approach is more streamlined than I think you

could have a purer PLC meeting and I think you could get it down to one period a day. I

just have concerns about teachers when it is all about the PLC that teacher don't have the

time to do things on their own and I am the kind of person that enjoys working as part of

a team, but I also felt that sometimes I wish I had more time to be left to myself and think

and come up with my own ideas. At times I felt the PLC was a little but too much and restrictive because everything had to be done through the PLC and that's just how I feel. The most valuable things I learned from my student teaching were from those meetings and having that type of interaction with veteran teachers and I may not have had that in more standard interactions and that I really valued. I think it is a great idea and I am going to a different high school and I hope they would be interested in this idea of PLCs. Moving forward I think more time could be spent on how the students are doing on assessments.

I think the two buildings should see each other's stuff too and I think common time between the two buildings would make a big difference because all of these common assessments are supposed to be identical between the two buildings and there is a lot of discrepancy. At the last meeting, it was funny a teacher had a different perception on the common assessment than I did. we didn't get into an argument, but a good discussion. I was sitting there going, listen you can give a common assessment that is identical, but that doesn't mean you have to base it on the identical project. You're not looking for the identical answer. You are looking to see how the kids approach that common assessment questions. He said we had to have identical projects, and I said but why? I said if we're dealing with the identical topic it doesn't mean they have to have identical projects. I think it finally got through to him but it took a long time. That's why I think we need to get to meet more. They are very good debaters at HS1. They like to play devils' advocate which leads to a very rich discussion but that is where I think there are other things that have to go on there. I only met him that once, but I found it very, very interesting when it

came down to "what do you mean you have to have identical projects? There are so many different ways to approach a problem" everyone is pretty much into the problem based. As to the overarching concept, that's where they don't agree because there are so few things you can deal with as an overarching concept in bio and that's where the difficulties are going on. Right now it looks like the common assessments are falling in if you were to put a biome on mars, but they are thinking about overarching that for the common assessments. So it's coming up with different ideas and it's great having everyone to throw things off of because we are seeing perspectives that we wouldn't see and they are seeing perspectives that they wouldn't see. Like I think a teacher was floored when she was talking about a new program because all she had heard was hearsay and for her to sit in a room with the teachers involved I think she was like this is cutting edge this is wild and I was like that what I was trying to tell you. I couldn't tell her because I am not doing it. They really need to have some common time where everyone can see what everyone else is doing.

Respondent 7: Just as a comment to really prove the point that it really is that time consuming because when you look at the PLC you look at it from in terms of honors bio, but then you have to take into account that that might not be the only class you teach. So are you going to be making PLCs for every class you have as a PLC or would it be welcomed to bring in questions from forensics or genetics or would it just be honors bio or would it be an all-encompassing PLC?

That was one of the big things that I had as a student teacher when I was completely 100% into the honors one and then had to drag myself through genetics on my own

mostly on a day to day basis because of how much time consuming it is. Towards the end it was easier to handle but initially there is a lot of challenge because you seem completely occupied in one area and you might lock up from the others. It was challenging working alone, it was extremely challenging, because it was easier to get ideas and refine ideas to get them down to a level when you felt happy with them and it was the best work you can versus working on your own and not entirely sure if it was getting to the point you wanted it to get.

Respondent 8: None

Respondent 9: Common prep periods really make it or break it and also it comes down to the individual commitment of the teacher who is in the PLC. If they want to make a successful one they will learn to commit the time, they will learn to compromise on ideas, and to always keep the goal of its not about me its about what I want to present to the students. Because when it becomes about you, you lose that sense about the goal, then the PLC starts to break apart. The biggest problem would be a clash of personalities and that entirely breaks the idea of the PLC. It really comes down to putting things behind and letting things go and you need to ask what is it that I want to get out of this, how is this helping me and really having your desire to be successful being much bigger than your idea of the individual case of what you are getting out of this. You are putting your students first regardless of your views or your prior relationships so it really comes down so it really comes down to the teachers themselves.

Curriculum Vitae

Rebecca A. McLelland-Crawley, NBCT, PAEMST 2011

EDUCATION

Walden University, Minneapolis, MN 2006-2014
Ed.D. in Teacher Leadership
Dissertation: Program Evaluation of a High School Science Professional Learning
Community
Chairwoman: Dr. Joanne Hinrichs

Thomas Edison State College, Trenton NJ 2010
Educational Leadership
Supervisor Certificate Option

Walden University, Minneapolis, MN 2005
M.S. in Integrating Technology in the Classroom

Kean College of New Jersey, Union, NJ 1997
B.A. in Biology, Teacher Certification Option

CERTIFICATIONS

New Jersey K-12 Supervisor Certification, 2010
New Jersey Certification - Biological Sciences grades 7-12, 1997
National Board Certification - Adolescence and Young Adult Science, 2003, renewed
2013

PROFESSIONAL CONFERENCES

New Jersey Science Teachers Association
• Service Learning - 2007
• National Board Certification - 2008
• Ecology Nature of Science; iMovies and Wikis - 2010
• Environmental Course Draft - 2011
• Podcasting, Blogging and Twitter in Your Classroom - 2012
• Engaging Students with PBL and an Authentic Audience through Video Conferencing -
   2013

National Association of Biology Teachers
- Improving Student Achievement through High Quality Professional Learning
  Communities - 2011

New Jersey Education Association
- National Board Certification – Success stories from NBCTs – 2013

New Jersey Association for Middle Level Education
- Assessing 21st Century Skills Through Real-World Problems - 2014

EdCamp STEAM
- Podcasting, Blogging and Twitter in Your Classroom – 2013

EdCamp NJ
- Problem-based learning in a standards-based grading classroom; National Board
  Certification – 2013

PROFESSIONAL EXPERIENCE

- Project 24 team National Expert, Alliance for Excellence in Education. Webinar
  presenter and blogger assisting schools making digital transitions. 2013, 2014 Digital
  Learning Day presenter.
- Biology Teachers Association of New Jersey Co-President (2008-2011), NJDOE Office
  of Math and Science Education Liaison and Stem Cell Resources Committee Member,
  2009 Science Standards Revision Chairperson, Café Connect presenter, Statewide
  professional development on NJCCCS standard revision, Statewide professional
  development on Bioinformatics, Bioscience Career Awareness, and SmartBoards,
  NJDOL Webinar Presenter, Newsletter contributor
- Ecology Nature of Science (ENOS) Curriculum Writer through Rutgers and Carey
  Institute
- New Jersey Math and Science Education Coalition – Board of Governors
- Environmental Science Course Outline Writer with the NJDOE and NJDEP
- Trained Performance Assessment reader for former EOC Biology test; Trainer for readers
  at Monroe location
- 2011 College Board AP Environmental Science Exam Reader
- Rutgers University "Global Citizen 2000" Curriculum Writer
- UMDNJ BioCONECT Curriculum Writer and Presenter

- National Board Certification Mentor through EIRC
- Technology Task Force, New High School Selection and Development Committee and Gifted and Talented Committee, Perth Amboy High School
- National Science Teachers Association (member)
- Association for Supervision and Curriculum Development (member)
- New Jersey Association for Supervision and Curriculum Development (executive board member)
- Phi Delta Kappa International

TEACHING AND ADMINISTRATIVE EXPERIENCE

2012-present School District
- Designed and provided engaging professional development on the Danielson Framework, Effective Classroom Technology Integration, Next Generation Science Standards, Standards-based Learning, and Online Communities of Practice. Coordinated grant-funded curriculum gap analysis and district-wide formative study on student misconceptions in science. Conducted teacher evaluations and cognitively coached faculty members through reflective post-conferences. Organized and received grant funding for creation of a student Maker Ambassador mentoring program to increase under-represented students in science through engineering.

1999-2012   *High School*
- Designed and implemented technology-infused, innovative daily lesson plans in Biology, Marine Biology and AP Environmental Science, while coordinating and adapting lessons with in-class support teacher for special needs students.
- Designed and maintained an original classroom website and used Google Docs, iTunes, SnapGrades, Skype, Diigo, Twitter, email folders, and other various Web 2.0 instructional tools to increase motivation, student achievement and parent communication.
- Designed and implemented district strategies for increased student interest and preparedness for Advanced Placement courses, coordinated PSAT, conducted sessions with English II classes to interpret PSAT scores, and coordinated vertical articulation sessions and workshops as the AP and Honors Resource Coach (2009-2010).
- Founded and planned local and statewide activities for the Environmental Club.
- Co-advised P2 scientific mentoring program with bilingual and general education students and Pfizer mentors.

- Coached Varsity and Competition Cheerleading teams.
- Organized and advised Odyssey of the Mind academic team.
- Founded and advised Science Honor Society.
- Organized and presented professional development workshops to staff members on professional learning communities, rubrics, science standards, National Board Certification, and grade management software.
- Mentored new staff members.

1997-1999 *Middle School*
- Created and executed daily lesson plans in earth, life and physical sciences for both regular and gifted and talented eighth grade students, while coordinating and adapting lessons with in-class support teacher for special needs students.
- Presented professional development for the staff on technology integration.
- Founded and planned activities for the Environmental Club.
- Organized and performed at various in-house assemblies.
- Trained student mediators and served as an advisor for conflict resolution club.