PEER OBSERVATION AS PROFESSIONAL LEARNING: A CASE STUDY TO DETERMINE THE EFFECTIVENESS OF THE STOP LIGHT LEARNING PROGRAM IN A SUBURBAN HIGH SCHOOL

A Record of Study

by

MICHELE DIANE STALEY

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DOCTOR OF EDUCATION

Chair of Committee,	Valerie Hill-Jackson
Committee Members,	Trina Davis
	Jean Madsen
	James Laub
Head of Department,	Michael de Miranda

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ABSTRACT

The purpose of this case study was to evaluate the effectiveness of the successful teacher observation protocol (STOP) Stop Light Learning (SLL) program as an effective personalized, job-embedded professional learning (JEPL) program focused on peer observation for science, technology, engineering, and math (STEM) teachers. The study explored the effect peer observation has on professional learning and offered program recommendations so that SLL ultimately has the impact of raising student achievement on high school campuses. The researcher used a case study approach at Redwood (pseudonym) High School (RHS) that employed quantitative analysis to evaluate the program. The participants' experience ranged from 0 to 26 years, so an analysis could made on the differing effects and perceptions of teachers throughout the phases of their career.

This record of study sought to answer the following overarching question: How does STOP Light Learning meet the professional learning needs of STEM teachers as an innovative, job-embedded peer observation program in a southwestern high school?

The following questions guided the study:

1. How do STEM teachers at RHS rate the quality of their SLL experiences as compared to other professional learning experiences provided by the campus and the district?
2. Do the STEM teachers at RHS believe that SLL should continue as an option for personalized learning?

3. How would the STEM teachers at RHS improve or change the SLL program at RHS?

Descriptive statistics were used to provide simple summaries of the survey information and practical significance of the data. The analysis of the data resulted in nine significant findings. A representation of the nine findings is listed here:

1. Teachers do not want school or district administrators designing their professional learning.
2. The teachers value voice and choice in their learning.
3. Teachers place significant importance on the ability to collaborate with other educators.
4. STEM teachers believe learning from others through peer observation is a valuable practice and should be continued at RHS.

The results also indicated that for this learning to occur, campus administrators must put systems in place to aid teachers in their growth and development.

DEDICATION

This research study and doctoral degree are a culmination of lifelong lessons, study, and a balance between work, family, and school, to reach an ultimate goal. Therefore, it is only fitting that I dedicate this work to my parents, Myra and Joe Hartman, without whom I would not be the person I am today. Their love and guidance have shaped me throughout my life, been the voice of conscience in my head, and a driving force for me when setting and achieving goals. These traits they instilled in me not only gave me the confidence, but the endurance and tenacity, to do my best in everything, take risks, and never give up. I will be forever grateful for their influence on my life and how it influenced me throughout my research and study.

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Contributors

This work was supervised by a record of study committee consisting of Professor Dr. Valarie Hill-Jackson, my Chair, of the Department of Teaching, Learning, and Culture and Professors Dr. Jean Madsen, Dr. Trina Davis, and Dr. James Laub, my committee members of the Department of Teaching, Learning, and Culture.

All work for the record of study was completed independently by the student.

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NOMENCLATURE

ASCD	Association for Supervision and Curriculum Development
CK	Content Knowledge
CPE	Continuing Professional Education
ELLs	English Language Learners
ESCs	Educational Service Centers
JEPL	Job-Embedded Professional Learning
HQ	Highly Qualified
PCK	Pedagogical Content Knowledge
PBL	Project-Based Learning
PD	Professional Development
PL	Professional Learning
PLC	Professional Learning Community
PPL	Personalized Professional Learning
SIG	School Improvement Grant
SLL	STOP Light Learning
STEM	Science, Technology, Engineering, Math
STOP	Successful Teacher Observation Protocol
TEA	Texas Education Agency
TEC	Texas Education Code

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CHAPTER I

INTRODUCTION

"All around the world, nations seeking to improve their education systems are investing in teacher learning as a major engine for academic success," (Darling-Hammond, Wei, & Andree, 2010, p. 1), and the United States is no exception. In the United States alone, billions of dollars are invested each year in K-12 professional development (PD) (Sawchuk, 2010). "High-quality PD is a central component in nearly every modern proposal for improving education" (Guskey, 2002b, p. 381). However, according to studies in the United States, few teachers are able to experience the sustained, continuous PD that the research suggests can make dramatic changes in teaching practice and therefore improve student performance (Darling-Hammond et al., 2010). In light of the increased interest in teacher development, a shift is taking place in the world of PD. PD is evolving from that of a passive, sporadically implemented experience, to an active, consistently implemented experience that occurs in the teaching environment and is supported by many colleagues in a professional learning community (PLC) (Stewart, 2014). Bleicher (2014) described how the collaborative effects of the PLC is transforming teacher education vernacular from professional development to professional learning (PL). PD is considered homogenous and directive in nature; PL, in contrast, is individualized and empowering; the teachers identify their own needs and design their growth activities accordingly (Choi, 2013).

The National Institute for Excellence in Teaching (NIET, 2012) stated that a broad new consensus has emerged in the field of educational professional development

promoting job-embedded professional learning (JEPL). JEPL allowed teachers the ability to learn on the job through collaboration and peer support (NIET, 2012). It can be described as an experience where teachers engage in activities that occur as part of their daily routine to further their professional learning and have a positive impact on student achievement (Burke, 2013). The School Improvement Fund guidelines, the Race to the Top grant application, and the School Improvement Fund regulations, all developed by the U.S. Department of Education, make reference to the need for JEPL; however, all lack concrete examples of what JEPL looks like (Croft, Coggshell, Dolan, Powers, & Killion, 2010). It is a new and emerging field in world of teacher professional development. The U.S. Department of Education as also provided guidance for using federal funds, such as Title 1, to encourage implementation of JEPL activities in high-need schools (Croft et al., 2010).

Figure 1.1 illustrates the movement in U.S. Pre-K 12 public schools from traditional, administration-designed, "sit and get" types of professional development to teacher led and teacher directed, job-embedded forms of professional learning. The right side of the figure, representing traditional PD, is reflective of learning that takes place outside the school building or removed from instruction and students (Croft et al., 2010). The traditional PD model also illustrates learning that is generalized for a large population of teachers who may teach a variety of lessons and subjects. In order for it to be categorized as professional learning, in-service teacher education should resemble the JEPL side of the figure that describes teacher opportunities for learning that could take place in the classrooms, with students, or during collaboration, co-planning sessions with a group of teachers. Professional learning occurs when teachers are growing themselves

specifically in areas in which they need to develop and in ways they have identified through self-reflection. JEPL is indicative of one form of professional learning. Whichever JEPL method is practiced, it is always embedded in the school building and during the school day.

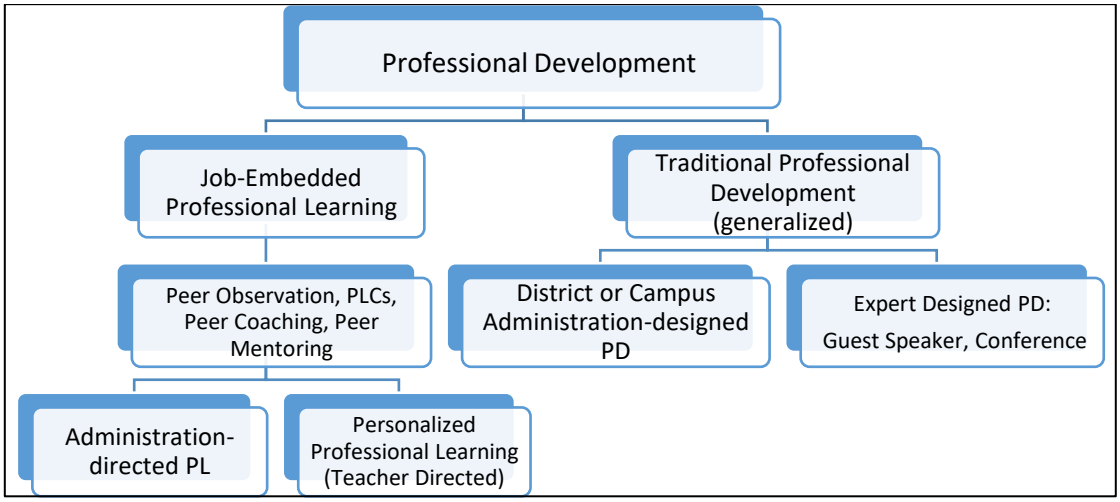

Figure 1.1. From Professional Development to Professional Learning.

The figure goes on to show that JEPL could still be mandated and directed by school administration. For example, a principal could require teachers to work with an instructional coach or to meet and plan in teams. However, in order for JEPL to be most effective, the experience would be led and designed by teachers who reflect on their own area of improvement and individualize their learning needs to design their own personalized professional learning (PPL) experience (Hunzicker, 2012).

Camburn (2010) stated, "Knowledge about teaching that is acquired in teachers' immediate work context (their classrooms and the larger school organization) may be more readily applied than knowledge acquired outside that context" (p. 466). His study found that interactions with peers based on instructional activities increased teachers' desire to

improve and reflect on their practice (Camburn, 2010). However, to achieve JEPL, a level of trust and risk-taking occurs when the adult learning is moved from an isolated activity to the public sphere of observation, coaching, or collaboration (Fullen, 2007). Figure 1.2 shows various examples of professional learning that is embedded in the context of the teachers' workday.

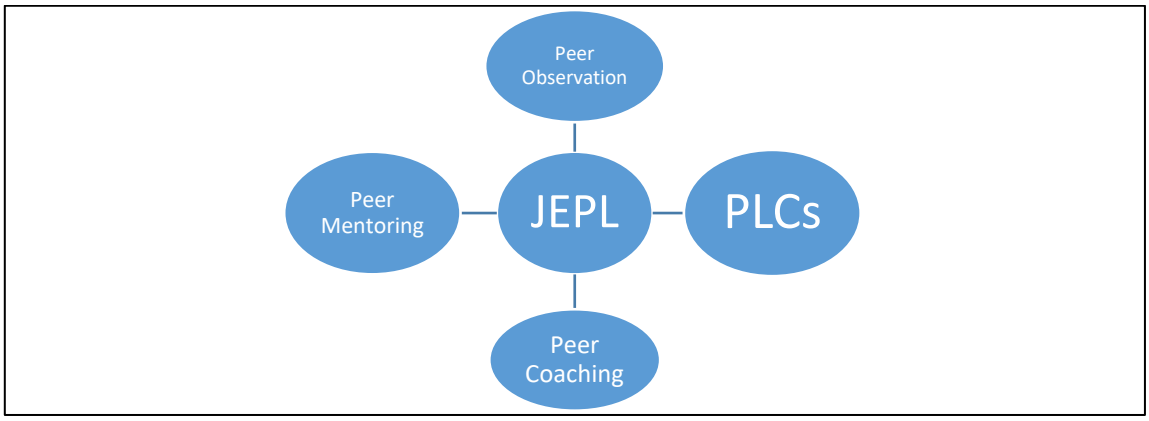

Figure 1.2. Examples of Job-Embedded Professional Learning.

The PLC is one example of an embedded professional learning opportunity according to Butler, Lauscher, Jarvis-Selinger, and Beckingham (2004). Embedded PL models provide teachers with individualized, campus-based, collaborative support; teachers can then apply what they are learning on their campuses, in their classrooms, and with their students in real time (Hamilton, 2012). The PLC can be defined as teachers working collaboratively during their planning period or after school to engage in an ongoing process of inquiry that aims to provide a better educational experience for the students, because good collaboration impacts all students (DuFour, DuFour, Eaker, & Many, 2006). Sergiovanni's (1992) vision of school transformation stated that when a critical mass of educators in a school community begin to change their practice, the entire school can change. That change in the school's culture occurs when teachers observe their

peers, are observed by others, and participate in discussions and reflection on the quality and effectiveness of their instruction (Bruce, Esmond, Ross, Dookie, & Beatty, 2010). Peer observation, peer mentoring, and peer coaching are other types of JEPL that build practitioner confidence and promote reflective thinking to transfer learning into practice (Hamilton, 2012). What these examples have in common is that they occur in real time, during the school day, with practicing teachers and students. Teachers may choose to participate in all or simply a few of the JEPL options outlined in Figure 1.2. The options can be used in conjunction to improve teaching and learning and/or simply in isolation as the experience of the teacher evolves over time.

All these PL models may have an impact on teacher learning; however, school leaders cannot measure teacher learning without some kind of evaluation to provide empirical data. Currently, much of the evaluation of PD by school leaders is still impressionistic, anecdotal, and focused on simple analysis (Earley & Porritt, 2013). Additionally, evaluation of PD often measures participant satisfaction rather than measuring the impact of the learning in a systematic and focused process (Nicolaidou & Petridou, 2011).

The Problem Space

In order to help students reach the levels of success demanded by the No Child Left Behind (NCLB) Act of 2001, which was reauthorized in December 2015 as the Every Student Succeeds Act (ESSA), the expectations established by state and national accountability systems and the demands of the district and community, teachers must have opportunities to develop new instructional practices and enhance their teaching practices (Borko, 2004). To assist these changes, educators are beginning to move away from

expert-driven, single-day PD events and are finding the experts in their own buildings and learning from them in real time (Patton, Parker, & Tannehill, 2015). They are doing this through ongoing, deep learning that is sustained through teacher collaboration to continuously improve teacher practices over time (Clayton, 2016).

A National Perspective on Teacher Professional Learning

Hirsh (2013), Executive Director of Learning Forward, believed in Learning Forward's definition of high-quality professional development as grounded in job-embedded collaborative learning programs. She continued to say, "Schools have an obligation to ensure that all teachers engage in continuous learning that helps them develop the knowledge, skills, and expertise to ensure the success of not only their students but their colleagues as well" (Hirsh, 2013, p. 1). However, the pull to meet performance-based standards coupled with student learning outcomes, such as the Common Core Standards, has taken that collaboration time away from the teachers (Killion & Hirsh, 2011). In order to ensure student success, teachers need PL that is:

> Intensive, ongoing, and connected to practice; focuses on the teaching and learning of specific academic content; is connected to other school initiatives; provides time and opportunities for teachers to collaborate and build strong working relationships; and is continuously monitored and evaluated. (Loucks-Horsley, Stiles, Mundry, Love, & Hewson, 2010, p. 5)

The Elementary and Secondary Education Act (ESEA) of 1965 emphasized the need for highly qualified (HQ) teachers in order to raise student achievement in Title II section 2101 of the law (U.S. Department of Education, 1965). Again, in the 1983 report, A Nation at Risk, a recommendation took that idea even further stating that teacher

learning should be designed by teachers. It was noted that "master teachers should be involved in designing teacher preparation programs and in supervising [beginning] teachers" (U.S. Department of Education, 1983, p. 39). When ESEA was reauthorized in 2001 as NCLB, the need for HQ teachers was still noted in Title II (U.S. Department of Education, 2001); additionally, the law again references the initial training a teacher is required to have to gain HQ status. None of these national movements address the ongoing PL needed or required of an educator to enhance his or her effectiveness in the classroom throughout his or her career. A March 2012 report by NIET entitled, "Beyond Job-embedded: Ensuring that Good Professional Development Gets Results," endorsed this idea for PD by citing the HQ vision shared in NCLB that professional learning should be "high quality, sustained, intensive and classroom focused, not one day or short-term workshops or conferences" (p. 2). Peer observation protocols help address this issue by empowering teachers with a JEPL process to assist in the growth and refinement of instruction (Grimm, Kaufman, & Doty, 2014). Although the ESSA reauthorization of ESEA removed the terminology and reporting requirements in Title II as required by NCLB, the law clearly charges states to train and employ high-quality teachers, principals, and leaders. The U.S. Department of Education (as cited in Croft et al., 2010), which continues to promote the use of JEPL as a professional learning tool, declared:

> We believe that the requirement to provide ongoing, high quality, job-embedded professional development to staff in a school is clearly tied to improving institutions in multiple ways. Frist, the requirement that professional development be "job-embedded" connotes a direct connection between a teacher's work in the classroom and the professional development the teacher receives. (p. 1)

While many of the national practices and policies refer to teacher leaning as professional development, the language in said policies clearly aims to promote and fund job-embedded professional learning though programs like the $4 billion School Improvement Grant (SIG) (Coggshell, Rasmussen, Colton, Milton, & Jacques, 2012). However, research on how to educate in-service teachers is a relatively young field and one which has developed in isolation from the wealth of research on best practices for teaching (Coggshell et al., 2012).

A State Perspective on Teacher Professional Learning

Establishing and leading teacher professional learning is a task charged to individual states and the schools districts that exist within. It is state and school district's responsibility to improve teacher quality (Blank & de las Alas, 2009). The Texas Education Agency (TEA, 1995) is "the state agency that oversees primary and secondary public education. The mission of TEA is to provide leadership, guidance and resources to help schools meet the educational needs of all students" (p. 1). In 1967, TEA established 20 regional Education Service Centers (ESCs) across the state of Texas. The purpose of these centers was to assist school districts in "raising student performance by enhancing educator effectiveness and helping schools maintain fiscal viability" (ESC, Region IV, 2015, p. 1). This agency and service center's primary focus is to meet the educational needs of the students by providing professional development and professional learning activities for teachers. These agencies do not, however, interact with students, but rather focus on developing the educators who do.

Educators in the state of Texas are required to complete at least 150 clock hours of continuing professional education (CPE) as required by the Texas Education Code (TEC) 21.041 every five years (TEA, 1995). As with the federal statues, this law designates

neither the type of professional development nor the manner in which it is delivered. It includes the caveat, however, that no more than 25% of those hours shall include activities to improve instruction. Table 1.1 outlines the requirements of the 150 CPE hours mandated in the state of Texas as of August 28, 2016. Table 1.1 clearly shows the law is not addressing and/or requiring JEPL at the state level, but rather leaving it up to the district or campus to define and implement JEPL priorities.

Table 1.1

Texas Teacher Continuing Education Requirements

Credit Requirement	Focus of Activity	Examples
At least 80%	Focus on standards required for initial issuance of teaching certificate	Content knowledge; Ethics and Conduct; district and campus priorities, research on how kids learn, classroom management; law; diversity; parental involvement; technology integration; reading; obstacles to student achievement; instructional practices
No more than 25%	No focus listed	Collecting and analyzing information to improve effectiveness in the classroom; at risk students; technology integration; diverse student populations (special education, economically disadvantaged, limited English proficient, dropouts).
Up to 12 CPE hours	Mental health first aid	In accordance with Texas Health and Safety Code §1001.203
Undisclosed credit	Suicide prevention training	In accordance with TEC §21.451
Undisclosed credit	Automated external defibrillator (AED) training	In accordance with TEC §21.0541

Many national organizations have Texas affiliates that offer PD such as Learning Forward Texas, the Texas Association for Supervision and Curriculum Development (ASCD), and the Texas State Teachers Association (TSTA), which is a subsidy of the National Education Association (NEA). The organizations offer traditional educator training through the use of conferences, consultants, and stand-alone PD sessions that would fulfill the Texas teacher's requirements for PD. These affiliates are also beginning

to use non-traditional online training and collaborative teacher environments to personalize the learning and create groups of learners. Learning Forward has become active in the state of Texas and recognizes the need for JEPL and believes that teachers learn best with and from one another (Hirsh, Psencik, & Brown, 2014)

The Problem of Practice

At Redwood (a pseudonym) High School (RHS) a new and innovative program called STOP (Successful Teacher Observation Protocol) Light Learning (SLL) was piloted, in the Spring of 2013. The goal of SLL was to help teachers learn from one another using peer observation in a job-embedded, personalized professional learning approach. This program was a new addition to the JEPL activities RHS had implemented in the preceding seven years and was part of a longitudinal shift from traditional PD to professional learning. Figure 1.3 shows the PL opportunities currently in use at RHS and illustrates the SLL program as the vehicle for peer-to-peer observation.

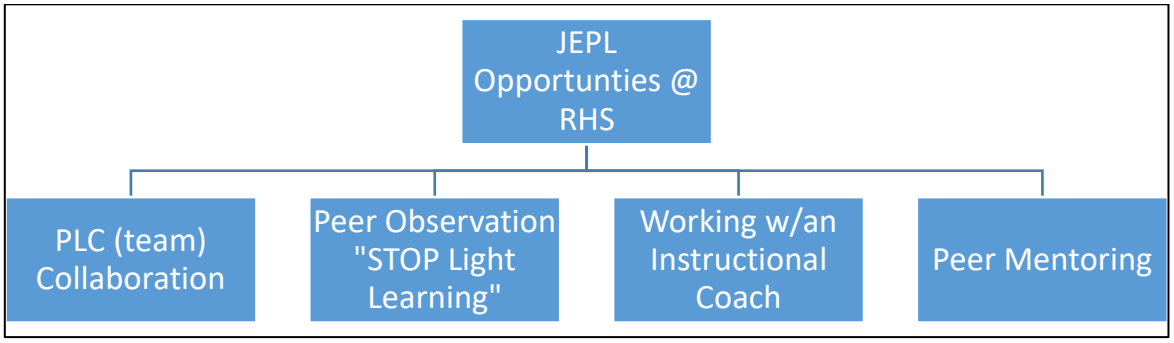

Figure 1.3. Professional Learning Opportunities at RHS.

Within the professional community at RHS, there are teachers whose students experience great success in academic pursuits, while the students of other teachers struggle to reach the same level of success; however, there is no way of knowing if the differences

are related to teacher PL. RHS refers to the successful teachers as "positive deviants." RHS subsequently identified these teachers as those from whom our school community could learn to increase the opportunity for and likelihood of success of all students (Marsh, Schroeder, Dearden, Sternin, & Sternin, 2004). RHS believed that the SLL peer observation program could help its staff become better teachers and increase teacher efficacy and student success, at scale, to meet the demands of both the state and federal accountability standards. While the SLL program has been in place on the campus for over three years as part of an overall JEPL initiative, an evaluation has not been conducted in order to gauge its impact on the professional development of teachers. There is a need to follow up on and evaluate this JEPL program so that its effectiveness can be ascertained and a clear link can be established between the PL, enhanced teacher quality, and the achievement of students (Earley & Porritt, 2013).

The study focused specifically on teachers in the fields of science, technology, engineering, and math (STEM). The problem of practice for RHS involves evaluating how SLL, an innovative, job-embedded campus professional development initiative, meets the needs of an effective personalized professional learning program focused on peer observation for STEM teachers in a southwestern high school?

"Across the United States, the need for strengthening students' capabilities in STEM fields is seen as crucial to continuing the country's role in the global economy" (Morrison, McDuffie, & French, 2015, p. 244). Therefore, the need for quality professional development for teachers in the STEM classrooms is also receiving more attention (Morrison et al., 2015). The Programme for International Student Assessment (PISA) showed the students scored average for 15-year-old students in math and science when

compared to 65 other countries, while countries like Finland, China, and South Korea were ranked at the highest levels (Erdogan, Navruz, Younes, & Capraro, 2016). There is an understanding that in order to increase student achievement in the STEM fields, stakeholders must focus on providing quality PD for the teachers (Erdogan et al., 2016). The lack of qualified STEM teachers is also supported by the 2010 National Academies report entitled Rising Above the Gathering Storm Revisited (Perez & Romero, 2014). This report brings to light "that during the 2007-08 school year, approximately one third of high school math students, half of physical science and chemistry students, and two thirds of those enrolled in physical science courses were taught by teachers outside of their field (Perez & Romero, 2014, p. 22). In 2011, high attrition rates were also noted for the field of STEM and showed 5% leave the profession each year (Perez & Romero, 2014). In order to keep these highly qualified teachers in the area of STEM, and as STEM education becomes stronger and more vital to the world economy, relevant and high quality professional development is needed for these teachers (Avery, 2013).

Figure 1.4 illustrates the documented professional learning offerings that took place at RHS during the 2014-2015 school year. The peer observation program, SLL, is noticeably absent from this list as it was not included in the documented PL offerings by the campus, nor the district.

The highest number of sessions, at 32% or 10 of 31 offerings, were listed as general instruction while the least was 1 in 31 or .03%, which is defined as specifically targeting English as a Second Language instruction. Technology was recorded as the second most numerous in its offerings at 8 or 25%, with teacher collaboration coming in third at 16% with 5 sessions. Therefore, only 16% of the teacher leaning experiences at RHS could be

characterized as PL as it has been defined as ongoing, teacher-driven learning. The other 85% of the PL was actually PD that was offered as a generalized learning opportunity for all teachers. Because SLL is missing from these data, Figure 1.4 is an illustration of the lack of evaluation or documentation of the SLL program for the 2014-2015 year showing the need for a formal study to determine its effectiveness and its inclusion in the campus and district documentation of yearly PL.

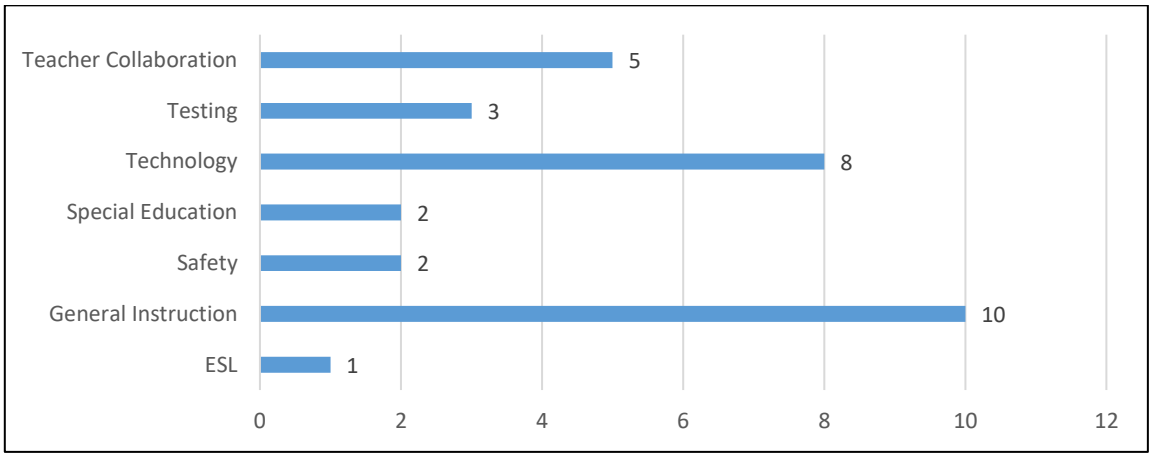

Figure 1.4. RHS Professional Learning Offerings, 2014-2015.

Context

Redwood High School (RHS) is a suburban school located in the southeast region of Texas in the Redwood Independent School District (RISD). The district serves five municipalities and two counties. Within the bounds of the school district is the Johnson Space Center, multiple medical centers, and a large contingent of oil and gas refineries. The community is diverse in its ethnicity and interests. The population of the school is 2,265 students in grades 9 through 12 with an ethnic distribution of 12% African American, 17% Asian, 32% Hispanic, 36% White, and 3% other. Additionally, 27% of the students receive free or reduced lunch service, 3% are English language learners (ELLs),

the at-risk population comprises 43% of the student body, and the school records a 10% mobility rate. In 2016, 81% of the students graduated with a recommended or distinguished diploma, 19% with a minimum diploma, with 9% of the graduating class qualifying as special education.

RHS has a total of 155 teachers. Seventy-six are core teachers, and 100% of the teachers are defined as highly qualified (HQ) as previously defined by NCLB. The teacher ethnic distribution is not as diverse as its student body with an ethnic distribution of 8% African American, 3% Asian, 9% Hispanic, 78% White, and 2% other. Seventy-one percent (71%) of the teaching staff's highest degree held is a bachelor's degree with 29% holding a master's degree; there are no teachers currently holding a doctorate. The experience of the teachers varies in that 6% of first-year teachers, 28% have 5 or less years, 30% are between 6 and 10 years, 28% are between 11 and 20 years, and 9% of the teaching staff have over 20 years of experience in the classroom.

> Redwood (a pseudonym) Independent School District's (RISD) mission is:
>
> To ensure that each student discovers and develops his or her unique talents and interests while realizing personal success and positively impacting his or her world through a new system distinguished by integrity, meaningful relationships, personalized learning, achievement, and a continuing commitment to Courage, Collaboration, Innovation, and Self-Direction. (Clear Creek Independent School District [CCISD], 2015)

This mission also extends to RISD teachers. RISD has adopted a personalized learning initiative, through its five-year strategic plan, to help both teachers and students meet the goals of personalization, collaboration, and self-direction. The move is supported by the

idea that PD should no longer be administered from the district administration. Professional learning is now in the hands of each school and its teachers, "from off-site training to job-embedded training and from generic skills to a combination that includes content-specific skills" (Templeton & Tremont, 2014, p. 55). One way the district has embraced personalized learning and JEPL is by providing and encouraging the use of instructional coaching at all levels of instruction. Joyce and Showers (1982) noted that teachers were being inundated with new curriculum, improvements in instructional practices, and other programs to enhance student performance; however, they were never given time for actual implementation (Killion & Harrison, 2006). JEPL activities, such as peer observation and coaching, give the teachers the necessary time, in the context of their daily work, to learn and implement changes to benefit students (Sandt, 2012). This makes the PL more meaningful by effectively tying it to teachers' daily practice and addressing a specific need identified by the educator through self-reflection (Dever & Lash, 2013).

Stakeholder Groups and Values

Currently, RHS has 48 STEM teachers, which is 33% of the teaching staff, whose course offering include, but are not limited to:

Science – Biology, chemistry, physics, environmental science, astronomy, and aquatic science

Math – Algebra I and II, geometry, calculus, statistics, pre-calculus, and college prep math

Technology – Graphic design and illustration, digital electronics, audio/visual productions, computer science, computer applications, and health science technologies I and II

Engineering – Robotics I and II, introduction to engineering design, principles of engineering, architecture & engineering, and aerospace engineering

The ranges of the classes begin at resource level and also include regular, honors, and advanced placement. Each of the teachers is highly qualified and possesses a current and valid Texas teaching certificate for the course(s) he or she teaches. Three of the teachers hold bachelors' degrees in engineering. The science and math classes are self-explanatory in that the objectives taught in those classes are aligned with the Texas TEKS and the traditional material taught in the United States. Graphic design and illustration is a class that combines art with technology. The students learn to manipulate and create graphics similar to what is used in the advertising industry today. Audio Visual production is a class where the students not only create their own mini movies, but also where they broadcast schoolwide announcements once a week. Health science technologies consists of (a) pharmacy tech classes, where the students are in the community learning at a real pharmacy; (b) certified nurse's assistant classes, where the students earn a certification; and (c) medical technology classes, where students learn vocabulary and learn to use medical devices currently used in hospitals and clinics. Computer science classes teach the students to code in languages such as A++ and Javam and the Robotics courses allow the students to learn about, build, and compete in robotics competition across the United States. The SLL program was initiated at RHS as a result of teacher request. A similar program was introduced to the staff through several meetings with small groups of teachers in the Fall of 2012. In those meetings and with discussions of the RHS teacher leadership team (department heads) and the site-based decision-making team, the administration created the SLL program as a trial, innovative program for the campus.

Research Questions

This record of study answered the following question: How does STOP Light Learning meet the professional learning needs of STEM teachers as an innovative, job-embedded, peer observation program in a southwestern high school?

The following questions guided the study:

1. How do STEM teachers at RHS rate the quality of their SLL experiences as compared to other professional learning experiences provided by the campus and the district?
2. Do the STEM teachers at RHS believe that SLL should continue as an option for personalized learning?
3. How would the STEM teachers at RHS improve or change the SLL program at RHS?

My Role

My role in implementing this study and evaluating the SLL program is significant as I have been the principal of RHS for the past eight years. As the instructional leader on my campus, I am responsible for both student achievement and teacher professional learning. A recent study indicated that when teachers received more than 50 hours a year of high quality training, teaching practices changed, and test scores increased by 21% (Darling-Hammond et al., 2010). Therefore, it can be concluded, that improving teacher knowledge and practice can be linked to improving student achievement (Sparks & Hirsh, 2000). It is my responsibility to evaluate the programs on my campus to ensure I am aligning the activities and education of my teachers, my students, and my campus with district, state, and national expectations. The SLL must be evaluated for its effectiveness as

a tool for teacher PL so the campus can make decisions regarding it as an effective JEPL tool and its continuation at RHS.

Purpose of the Study

The purpose of this case study was to evaluate the effectiveness of the SLL program as an effective personalized, job-embedded professional learning program focused on peer observation for STEM teachers, its effect on professional learning, and its ability to offer program recommendations for moving forward so that SLL ultimately has the impact of raising student achievement. It employed a quantitative analysis approach to evaluate the program as it related to other JEPL activities on campus and districtwide as well as measuring the improvement of teachers' use of higher level questioning skills in STEM classes. This initial study helped inform the campus about improvements or changes necessary to make the program more effective for the teachers at RHS. The study apprised the campus leadership as to the staff's input regarding continuation or abandonment of SLL as an option for JEPL in the future. A decision about program continuance can be made based on the results of the study. Likewise, the methods of the study can be expanded campus wide to garner input from a wider array of stakeholders and include the effect on student achievement.

Significance of the Study

This study is significant in that it was the first time the program was evaluated for its effectiveness as a JEPL tool for STEM teachers. SLL has been in place at RHS for three years without any means of formal evaluation. If the program is to be a model for the school, and eventually the district, the study will provide the data and evidence needed to justify its existence and possible expansion. It will also allow the teachers' voice to help

determine whether it should be continued, and if so, improvements that can made to strengthen the program. Ofsted (2006) reported many schools lack the awareness to evaluate the effectiveness and impact of PD, which is possibly the weakest area in the movement to improve PL. This study will add to the literature and research based on peer observation, job-embedded learning, peer coaching, and personalized professional learning (PPL). The National Research Council agrees that more studies are needed to determine the efficacy of PL activities including those extended over time and that involve teachers working together (Garet, Porter, Desimone, Birman, & Yoon, 2001).

Definition of Terms

For the purpose of this record of study, the following definitions and acronyms were used.

Campus Led PD: Professional development that is decided upon, developed, and led by the campus administration or representatives thereof.

Coaching: Professional, ongoingclassroom modeling, supportive critiques of practice, and specific observations that form an inquiry-based learning model characterized by collaboration between individuals or groups of peers (Poglinco et al., 2003).

Community Provided PD: Professional development provided to the teachers for free by a community organization such as a museum, drug rehabilitation center, etc.

Consultant PD: Professional development provided to the district or campus for a fee, by an outside professional or expert in the field.

District Led PD: Professional development that is determined, developed, and delivered by the district administration or appointees.

Job-embedded Professional Learning (JEPL): "Teacher learning that is grounded in day-to-day teaching practice and is designed to enhance teachers' content-specific instructional practices with the intent of improving student learning" (Croft et al., 2010, p. 2).

Peer Observation: To enable teachers to learn from each other in the context of their daily work by observing colleagues for the purpose of sharing practice, receiving feedback, and facilitating critical reflection on their practice of teaching (Sandt, 2012).

Personalized Professional Learning (PPL): A customization of professional development tasks in which the educator is in control and can choose the activities that will enable him/her to achieve growth by engaging in content specific to the learners needs, goals, and work environment (Gamrat, Toomey Zimmerman, Dudek, & Peck, 2014).

Professional Development (PD): Participation in a learning activity that is passive, one-time instruction designed for a whole group or staff setting (Choi, 2013; Stewart, 2014).

Professional Learning (PL): An internal, individualized learning process where teachers are engaged in their learning to create knowledge through experiences and interactions with new information and collaboration with peers (Timperley, 2011).

STOP Light Learning (SLL): STOP is an acronym for Success Teacher Observation Protocol. It is an innovative, job-embedded campus peer observation initiative, created by Redwood High School, to encourage teachers to learn from one another through observation, reflection, and collaborative feedback.

Teacher Collaboration PL: Professional learning that is teacher planned and directed to meet the needs of the teachers and the students. Examples are (a) data disaggregation, (b) lesson study, (c) grading alignment, and (d) lesson design.

CHAPTER II

LITERATURE REVIEW

Professional development involving peer observation has been around for decades; however, it has taken on new meaning in the 21st century. The improvement of teachers through PD to increase their expertise practice of teaching has become a predominate area for educational reform (Elmore, 1990). Educators are realizing that less effective teachers can become more effective teachers with high quality PD (Hirsh, 2013). An understanding of the concepts listed below, based on existing scholarship in the field, will support the overarching question of this study in the understanding of how STOP Light Learning meets the professional learning needs of STEM teachers as an innovative, job-embedded peer observation program in a southwestern high school. In order to truly understand all that SLL encompasses, this chapter explores the topics of (a) historical perspective on K-12 PD, (b) evaluation of PD, (c) differences between PD and PL, (d) job-embedded professional learning, and (e) peer observation.

Conceptual Framework

Two theories drove this study, thereby offering a conceptual framework to the problem of practice. Adult learning theory, andragogy, was originally defined by Knowles (1980), as the art and science of helping adults learn. One of the founding principles of his theory was based on the role experience plays in the learning process. However, experience is not just valuable to education because of the reservoir of learning the adults bring with them, Knowles (1980) also believed that people will attach more value to their learning if they gain it through experience rather than acquiring it passively. It is with this

belief that job-embedded learning opportunities are beginning to proliferate in the educational setting. Thus, there is a need to evaluate the SLL program. Vygotsky supported Knowles' theory when the former researcher found the most valuable professional learning occurs by interacting with one's peers in observations and conversations about teaching and learning in a true educational environment and subsequently reflecting on what those experiences support (Wise & Jacobo, 2010). The SLL program allows teachers to construct their own learning through the observation of others.

The second theory at work in this study is evaulation theory illustrated by Guskey's evaluation model. Guskey (2016) posited there are five levels necessary for an effective evaluation of a professional learning program: (a) participant reactions, (b) participant learning, (c) organizational support and change, (d) participant use of knowledge and skills, and (e) student learning outcomes. Guskey asserted that his heirarchally arranged model not only addressed a broad range of "what" questions, but also "why" questions. This model holds that there are three important implications that stem from this model, specifically:

1. The data gathered at each of the five levels of evaluation are important as they provide vital information for the improvement of the quality of the professional learning.
2. It is important to understand that success or effectiveness at one level does not necessarily lead to success at another level. Guskey noted that most government officials and policymakers are unaware of the complexities of moving from level 1 to level 5.

3. Backward design is necessary when planning a professional learning experience (Guskey, 2016).

There are many models of evaluation that could have been selected for this study since evaluation theory is an umbrella term for any number principles used to guide practice (McNall, 2009). Evaluation and evalution theories are necessary as a way of consolidating information and learning extrapolated from current and prior experiences (Mark, 2005). Daniel Suffelbeam, a well known evaluation theorist, stated that evaluation is based on three models: (a) question or methods, (b) improvement or accountability, or (c) social or advocacy approaches (McNall, 2009). Similar to Shuffelbeam, Carden and Alkin (2012) ordered evaluation theories in an Evaluation Theory Tree consisting of three branches: (a) method, (b) use, and (c) value. For example, Shuffelbeam himself based his CIPP (context, input, process, and product) model on improvement and accountability (McNall, 2009). Donald Campbell emphasized decision-making for program implementation and its possible effects or use (Mark, 2005). Joseph Wholey was focused on performance-measure systems so that upper management could make informed decisions in an ongoing process (Mark, 2005). Utilization-focused evaluation, by Michael Patton, is based on the intended use by the users. With the numerous evaluation theorists in the world of evaluation theory, choosing the appropriate evaluation methodology is a daunting, but important process, for any study (Mark, 2005). Since Guskey's (2016) model focused specifically on professional learning and was focused not only on student outcomes, but ways to improve professional learning experience, it is an appropriate evaluation model for this study.

Historical Perspective on K-12 Professional Development

The field of education has evolved from a system in which teachers work in seclusion, to collegial collaboration, and recently the system has expanded into a practice that changes professional development from a formal structured activity to one that is embedded in teachers everyday routine (Roesken-Winter, Hoyles, & Blomeke, 2015). As far back as 1975, the educational community has recognized that traditional training methods are ineffective because teachers must be involved in their own development (Davies & Aquino, 1975). Goddu, Crosby, and Massey (1977) defined traditional staff development as isolated learning experiences, either after school or during student release time, where district or campus leaders deliver a workshop type training given in a campus-wide format provided by an outside expert or campus administrative personnel. In 1980, Joyce and Showers completed a two-year examination into the research concerning teacher professional development in an attempt to uncover effective training approaches to move beyond tradition PD. Joyce and Showers (1982) were able to draw the following three conclusions from their research:

1. Teachers can acquire new skills and teaching strategies to increase their competency as an educator.
2. Current conditions in which staff development is presented is not suitable for learning even when the teachers are involved in planning the training.
3. Specific conditions for providing teachers the opportunity to effectively grow in their practice were uncovered such as modeling, feedback, goal setting and peer observation.

In fact, Joyce and Showers (1982) stated that the results of the training studies, which spanned two decades from the 1960s through the late 1970s, were remarkably consistent in showing successful teacher PD can be transferred to the classroom if teachers are provided opportunities for any combination of modeling, practice, or feedback. This study exemplified a change in the way PD was beginning to be viewed in the United States. Prior to the 1980s, teachers "defined their success in terms of their pupils' behaviors and activities, rather than in terms of themselves or other criteria" (Guskey, 2002b, p. 382).

This new job-embedded trend in the burgeoning body of research concerning how PD should be delivered continued into the 1990s and 2000s; however, in practicality, it did not change in the school environments in which PD was delivered in the traditional model. A 1996 to 1999 evaluation of the Eisenhower Professional Development Program showed that high quality, effective PD was not being delivered to teachers on a consistent basis (Choy, Chen, & Bugarin, 2006). In addition, a 1997 survey by the Consortium for Policy Research in Education (CPRE), which reviewed PD in all 50 states, found many districts were still bound by the traditional in-service workshop method with no link to teachers' needs or teaching assignments (Choy et al., 2006). The 1999-2000 Schools and Staffing Survey (SASS) corroborated these studies when surveys found that:

1. Sixty-seven percent (67%) of the responsibility for teacher professional learning was determined by district or campus administration.
2. Twenty-one percent (21%) of the professional development activities were provided by outside consultants.

3. Between 81% and 89% of public school administrators stated that their campus professional development was dictated by district and school improvement plans as well as academic and skills standards.

In June 2009, The Council of Chief State School Officers (CCSSO) undertook a meta-analysis review of 16 studies, due to a grant from the National Science Foundation (NSF), to determine the effects of PD on student learning (Blank & de las Alas, 2009). CCSSO's study shows a shift in the landscape of PD in that now it is frequently tied to increased student achievement and student learning standards in part due to NCLB and other education reforms. The study showed consistent positive effect on gains in student achievement (Blank & de las Alas, 2009) as a result of teacher PD. The results also showed common patterns for successful PD as:

1. Learning content and subject specific material
2. Learning how to teach that content with a study in pedagogy
3. Multiple follow-up activities
    a. Implementation assistance (coaching)
    b. Support from mentors and colleagues (Blank & de las Alas, 2009).

This shift to a more collaborative and experiential PD experience is also exemplified in the 2012 Metlife Survey of the American Teacher: Collaborating for Student Success, where 67% of teachers voiced that they value collaborative learning and problem-solving. The survey also found that more than 60% of teachers stated that their opportunities for collaboration are either the same as those that were available or fewer than those available in 2009. All of this indicated that more study and implementation is needed to move teacher learning to one that gives teachers time to develop, experience, collaborate and

practice their new knowledge and skills in real-time with their students and peers (Opfer & Peddler, 2011).

Teacher PD continues to evolve in the second decade of the 21st century as more research is taking place designed around improving the professional development experience for all teachers. Differentiation of PL is not only being touted by educational scholars but is being studied and showing promising results (Minor, Desimone, Lee, & Hochberg, 2016). The authors stated the importance of differentiated activities designed around the needs, content knowledge, and learning levels of the teachers for which it was being provided (Minor et al., 2016). The study went on to point out that "Teacher quality, and the critical role that PD plays in supporting teachers in effectively implementing instruction" (Minor et al., 2016, p. 21) is vital for preparing students to succeed in our rapidly changing world. An example of differentiation would be teachers videotaping themselves rather than observing other teachers. Little (2012) posited the depth and specificity of reflection that can be achieved with this method is unlikely to be attained during an observation visit using a protocol.

Professional Development for Secondary STEM Teachers

"In a 2009 study conducted by the Organization for Economic Co-operation and Development, American students ranked 17th of 24 developed and emerging countries in science literacy and 25th in math literacy" (Perez & Romero, 2014, p. 21). Additionally, less than one-third of 8th grade students in the United States demonstrated math and science proficiency on the National Assessment of Educational Progress (NAEP) (Perez & Romero, 2014). Schools around the nation are concerned with the lack of qualified science and math teachers as well as the attrition rate for those currently in the field (Perez &

Romero, 2014). These statistics, and other like them have created an awareness around the need for high quality professional development for teachers in the area of STEM. “There is considerable evidence from different studies suggesting that how teachers behave in the classroom, the instructional approaches they employ, significantly affect the degree to which students learn” (Stearns, Morgan, Capraro, & Capraro, 2012, p. 9). Therefore, there is a need to focus on the PD of STEM teachers and its effectiveness (Stearns et al., 2012).

In 1996, the National Research Council (NRC) released the National Science Education Standards (NSES) as a foundation reference for state standards in science (Campbell & Smith, 2013). It guided teachers away from lecture and textbooks to a more engaging, inquiry-based approach in which the student and teacher experience the science (Koomen, Blair, Young-Isebrand, & Oberhause, 2014). In its report, the NRC acknowledged “the importance of classroom instruction as a change agent” (Campbell & Smith, 2013, p. 162) and that improving teacher quality is the most promising strategy for achieving the change. The NSES used Vygotsky’s constructivist approach as a framework for the standards believing the learning should be built through experiences that we now call inquiry-based learning (Campbell & Smith, 2013).

The standards consistent with constructivism will:

- Focus and support inquires while interacting with students.
- Orchestrate discourse among student about scientific ideas.
- Challenge students to accept and share responsibility for their own learning.
- Recognize and respond to student diversity and encourage all students to participate fully in science learning.

- Encourage and model the skills of scientific inquiry as well as the curiosity, openness to new ideas and data, and skepticism that characterize science (NRC, 1996, p. 32).

Nevertheless, the inquiry-based learning also extends to teachers in the PD arena. STEM teachers need feedback on their instruction as well as support from their peers (Stearns et al., 2012). The support can come in the form of PLCs coupled with peer observations and feedback to improve the teacher's instructional practice (Stearns et al., 2012). Inquiry-based practices have also been endorsed by the Next Generation Science Standards (Trygstad, Smith, Banilower, & Nelson, 2013) and the Framework for K-12 Science Education (Lakin & Wallace, 2015). However, research regarding how teachers learn about and implement these practices continues to be a priority to the science education community (Lakin & Wallace, 2015). Research is ongoing using JEPL methods such as teacher mentors and teacher coaching to improve teacher efficacy with inquiry-based learning (Lakin & Wallace, 2015). In order to implement this inquiry-based approach for students, the teachers must understand and experience the approach as well; however, experience with inquiry-based instruction is what is lacking in most educators today (Kazempour & Amirshokoohi, 2014). The STEM teacher PD recommendations do not differ from PL recommendations for all educators. Teachers need long-term, collaborative, research-based experiences with a community of their peers that can be performed and actualized in their classroom (Kazempour & Amirshokoohi, 2014).

Teachers, as a role model for their students, can model enthusiasm for learning, a sense of wonder, and exploration into innovation (Bilgin & Balbag, 2016). It is just as important for STEM teachers to engage in experiential learning as it is for the students

(Bilgin & Balbag, 2016). Kooman et al. (2014) performed a study on providing inquiry-based, experiential PL in which teachers designed and carried out experiments and collected data to support their hypothesis with professional scientist acting as mentors and facilitators. The results showed that teachers' confidence grew, and their classroom practice of inquiry-based instruction improved as a result of their PL experiences; mentoring and collaboration had a positive impact on the teachers' ability to translate their learning to the classroom environment. It is important to note, however, that the learning needs to be continuous in order for the educators to internalize the experiences to draw from them in the future (Kooman et al., 2014).

Along with inquiry-based instruction, another trend in STEM PD is built around the idea of teachers' content knowledge (CK) or specifically in science called pedagogical content knowledge (PCK) of scientific argumentation (McNeill & Knight, 2013). Here again, it is posited that "PD that supports teachers' PCK needs to be based on constructivist theories" (McNeill & Knight, 2013, p. 941) grounded in experiences such as classroom video recordings and observations, so teachers can view students' argumentation skills and other educators' facilitation skills in real time. In McNeill and Knight's 2013 study, they used a workshop on argumentation followed by classroom observations and student writing samples to collect data on the impact of the PL on teachers' classroom instruction. The results of the study showed it was difficult for the teachers to grasp the full concept of argumentation even with a long-term study involving observation. Therefore, in the future, scaffolding a progression of skills might be more effective in supporting the learning an implementation of PCK argumentation skills in the secondary classroom (McNeill & Knight, 2013). PCK studies have also been used in

transitioning teachers from traditional forms of PD to a JEPL approach for science educators.

The idea of content knowledge and its influence on the PD experiences of STEM teachers was also studied by Minor et al. in 2016. These researchers agreed that building teachers CK so that it can be shared in meaningful ways requires an embedded plan in the teachers' workday that is sustained and content focused as well as providing for practice, feedback, and discussion (Minor et al., 2016). Their study asked the question, "How does teacher CK moderate the effects of PD on teachers, and how does the nature of the PD . . . influence this relationship?" (Minor et al., 2016, p. 3). The results of their study showed:

1. When STEM teachers were exposed to high quality PD, the amount of teacher learning was directly correlated to their CK, or what they already knew. A high degree of CK resulted in a high degree of learning.
2. One size fits all PD models will not result in the kind of sustained, continuous, learning STEM teachers need to help our students achieve in the 21st century. Differentiated PD or calibrated activities designed to meet the learning needs of individual STEM teachers is needed to increase classroom effectiveness.
3. How a teacher reacts to the PD activity in vital in determining the extent to which the PD experience help the STEM teacher grow and change (Minor et al., 2016, p. 21).

A 2013 project-based learning (PBL) study trained teachers in the traditional conference setting for a two-week content training. However, that training was combined with JEPL follow-up activities such as collaborative team planning and lesson study to bolster the effectiveness of the program (McConnell, Parker, & Eberhardt, 2013). A three-

year study focused on professional learning in the area of integrating innovative technologies into the curriculum also used a combined approach. The first phase of the project focused on teacher immersion into the field research setting. The second phase was focused in a JEPL setting in the classroom, with real students, using the innovative technologies in community-based research projects. The third phase was a complete integration into teacher lesson designing, collaborative planning, and teaching of all sciences in the classroom (Ebenezer, Columbus, Kaya, Zhang, & Ebenezer, 2012). These studies revealed that although PL in the high school STEM arena is moving to a more long-term, in class, experiential approach, there is much more work and research to be done in order to learn about and evaluate programs for their effectiveness with teachers and ultimately with student achievement.

Professional Development in RISD

An analysis of the RISD secondary teacher professional learning opportunities for the 2014-2015 school year revealed 1544 sessions available to the district teaching staff. Figure 2.1 provides a breakdown of the categories provided by the 17 secondary campuses and the district itself. These data reflect the district's focus on technology integration as it encompassed the largest focus at 20% of the opportunities, while diversity training ranked lowest on the list comprising only .1% of the year's professional learning. Ninety-three (93) of 1544 courses, or 6%, were considered embedded in the school day.

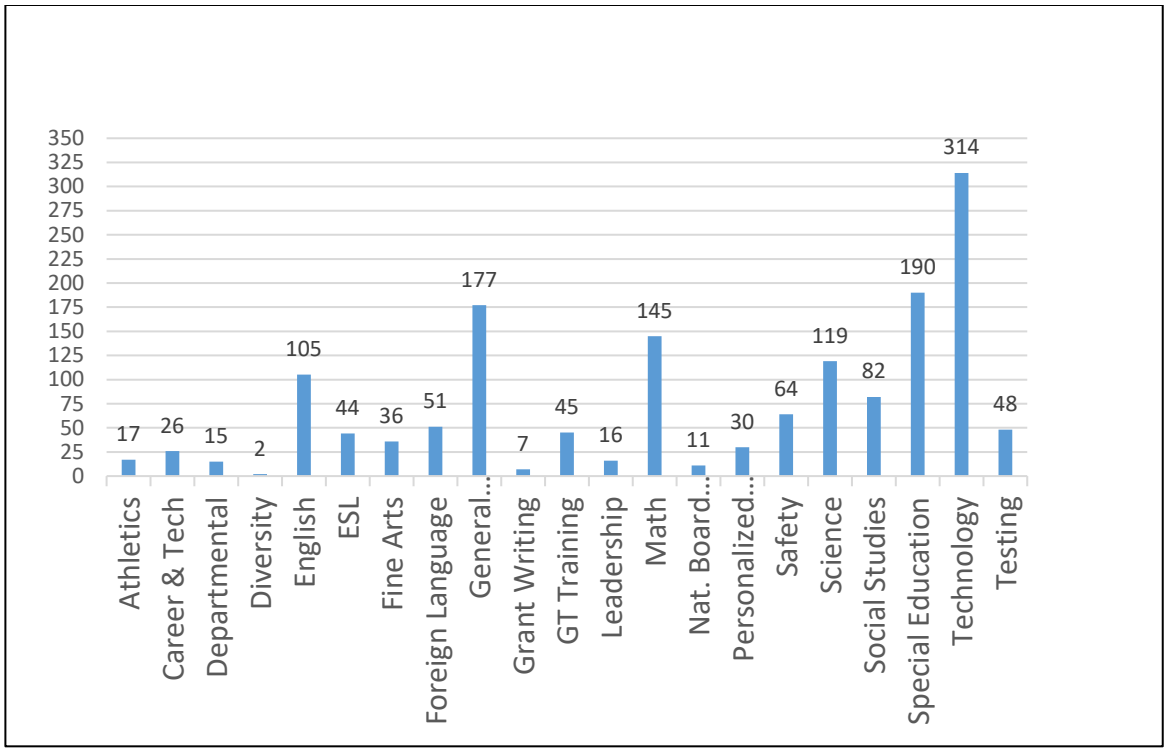

Figure 2.1. RISD Professional Learning Offerings by Category, 2014-2015.

The data were then further subcategorized in Figure 2.2 to show the delivery method of the instruction. The analysis revealed 4.6%, or 55 sessions, of the planned instruction allowed for personalization by the teacher. A majority of the training, 46% or 706 sessions, was led by a district-level employee, followed by 412 sessions, or 27%, led by a campus educator. This shows that RISD is neither utilizing the best practices of job-embedded, personalized professional learning nor is it providing opportunities for PD in its goals of personalization, collaboration, and self-direction stated in the district's mission statement. SLL may be a viable program to fill the vacancy left by the district; however, the initiative must be properly evaluated and studied to ascertain the feasibility of not only continuing the program, but possibly expanding it to other schools in the district.

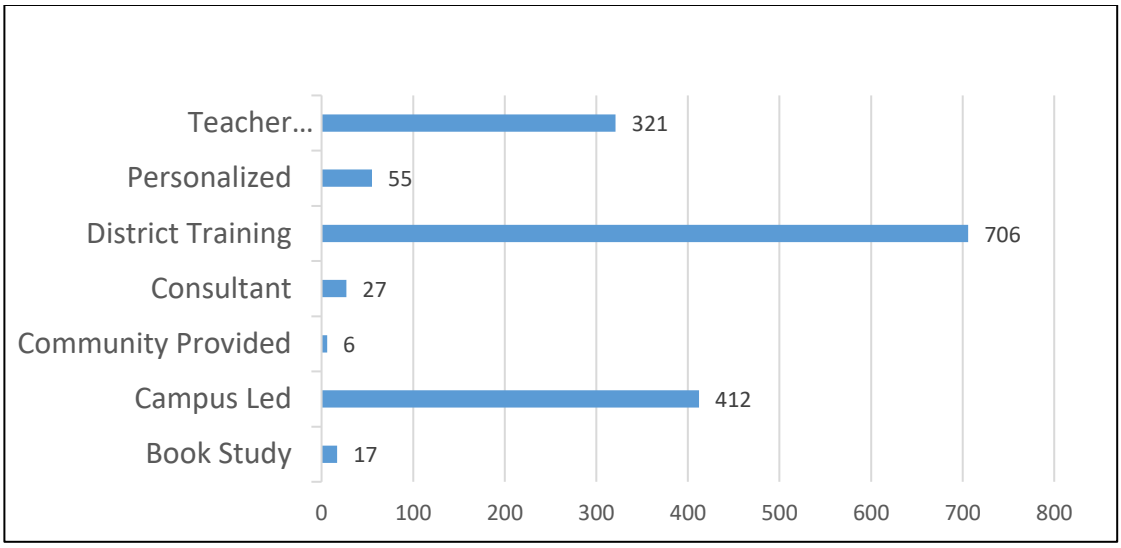

Figure 2.2. RISD Professional Learning, 2014-2015.

Currently, at RISD teachers are required to participate in 60 hours of PL each school year. Figures 2.1 and 2.2 show the various ways in which teachers may earn PL credit. Due to state requirements, some of the courses, such as suicide prevention training, sexual harassment training, and state testing administration training, are mandatory, while others may be required by the school or district, such as employee handbook training, curriculum updates, and technology training. All the instruction outlined in Figure 2.2, with the exception of the book study and personalized categories, are offered before or after school or during a campus in-service day. Occasionally, the teacher is pulled out of the classroom to complete this required training. The data again show RISD is lacking a job-embedded, personalized professional learning initiative required by its strategic plan.

STEM Instruction and the Learners

"Despite the recent increase in the number of women and people of color who study and work in STEM fields, women and minorities continue to be underrepresented" (Grossman & Porche, 2014, p. 698). The reason for these low numbers, begins as early as

5th grade when girls report less confidence than boys in the STEM classes (Grossman & Porche, 2014). Moreover, a study into African American students' interest in STEM at the high school level reported that 61% were not interested in pursuing any STEM field (Grossman & Porche, 2014). This could be due to a decreased access for Hispanic and African American students in urban schools to advanced placement STEM classes (Grossman & Porche, 2014).

In 2010, the National Science Board (NSB) stated that bachelors' degrees earned in the STEM field only comprised of one-third of all degrees in the United States (Zhang & Barnett, 2015). According to the NSB's Science and Engineering Indicators, the gap widens when race and gender are taken into consideration (Zhang & Barnett, 2015). The President's Council of Advisors on Science and Technology (PCAST) stated, "Diversity is essential to producing scientific innovation, and we cannot solve the STEM crisis . . . without improving STEM achievement across gender and ethnic groups (Zhang & Barnett, 2015, p. 638). The issues have been dubbed a problem in the "pipeline" from school to work and there is an urgent need for educators to understand and learn where the disinterest in the STEM fields occurs and why (Zhang & Barnett, 2015).

A key reform, at the national level, to mitigate this discrepancy in the STEM fields, is to improve education and life outcomes for underrepresented students. In 2010, Obama's PCAST called for an expansion of 1,000 new STEM-focused schools to open in the United States in the next 10 years (Eisenhart et al., 2015). Contrary to some beliefs, the idea of a STEM school dates back to the Sputnik era and while others, as long ago as the early 1900s (Eisenhart et al., 2015). In 2007 there were roughly 315 public STEM schools in existence in the United States; by 2014 there were only 358 (Eisenhart et al., 2015). Even

though STEM schools have been in existence for quite some time, there has been little research on the effectiveness of these schools on minority populations (Eisenhart et al., 2015). In the past, STEM schools were exclusive, requiring an application and only admitting top-performing students, usually White males. However, since 1999, the trend has been to become more all-encompassing with no requirements and an intention of admitting low-income, non-Asian students of color, and females (Eisenhart et al., 2015). These STEM schools are being referred to as Inclusive STEM Schools.

Regardless of the school structure for STEM education for underrepresented groups, the students face many barriers to a career in STEM (Simpkins, Price, & Garcia, 2015). "A recent theoretical piece on STEM career choices stated that motivational beliefs are one of the central determinants of success throughout the STEM pipeline" (Simpkins et al., 2015, p. 1387). It is believed that parental support and experience outside of the school day are vital especially for non-White students (Simpkins et al., 2015). Girls may also face challenges dealing with gender roles, while students of color must tackle possible discrimination and stereotyping (Grossman & Porche, 2014). Here again, "despite extensive investigation of the effects of racial/ethnic discrimination, little research explores discrimination and stereotypes specific to minority adolescents' STEM success" (Grossman & Porche, 2014, p. 701). Research, at this time, has not discovered why we continue to have a disparity in the underrepresented group in STEM education and careers; however, these scholars do agree that there is more work and research to be done to create equity in the area of STEM.

Evaluation of Professional Development

In order to understand the need for this study, the roots and history of measuring and evaluating PL by educators must be examined. One evaluation method, introduced by Kirkpatrick in the 1950s, is based on a four-level business world model, Figure 2.3.

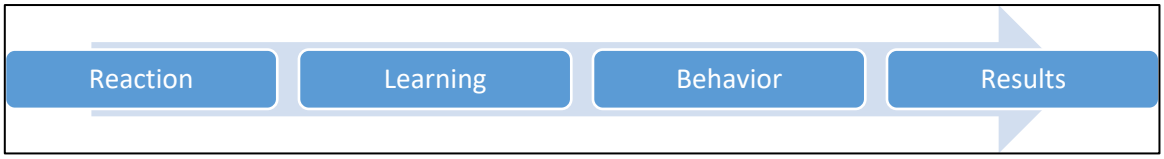

Figure 2.3. Kirkpatrick's Model of Evaluation.

His four levels consisted of:

Level 1 Reaction – The degree to which participants react favorably to the learning event.

Level 2 Learning – The degree to which participants acquire the intended knowledge, skills, and attitudes based on participation in the learning event.

Level 3 Behavior – The degree to which participants apply what they learned during training when they are back on the job.

Level 4 Results – The degree to which targeted outcomes occur as a result of the learning event and subsequent reinforcement. (Kirkpatrick & Kirkpatrick, 2009)

This type of evaluation model would be used to characterize a traditional PD learning environment in which PD is a one-day event rather than an ongoing process that is embedded in the school day. However, even Kirkpatrick's 1950's model, using teacher learning and its effect on student achievement, would be a measured metric of success.

Another evaluation framework, introduced by Stake in 1967, Figure 2.4, focused on three aspects of PL (King, 2014).

Figure 2.4. Stake's Evaluation Framework.

Stake used antecedents to describe how the environment was before the learning; transactions to describe what occurred during the learning and outcomes focused on the results of the training (King, 2014). King posited that this model was ineffective in PL evaluation because it was difficult to establish the cause and effect relationship between the PL and the outcomes by simply looking at learning at before, during, and after the event (King, 2014). Hall and Hord (2011) introduced yet another framework in 1987, illustrated in Figure 2.5, that was comprised of 8 levels: Renewal, integration, refinement, routine, mechanical, preparation, orientation, and non-use.

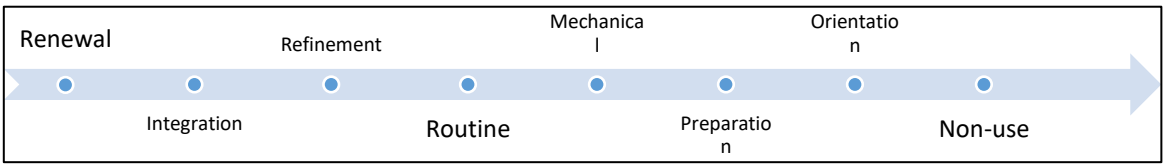

Figure 2.5. Hall and Hord's (2011) Evaluation Model.

The levels are meant to provide schools a means to assess the quality and degree of change in their schools. However, Hall and Horde (2011) themselves admitted they were unsure of the processes needed to sustain long-term use of an innovation even when progressing through their framework. They additionally conceded that the framework was

more geared toward assessing and evaluating an individual's journey in the learning rather than the entire school.

At the beginning of the 21st century, Guskey (2002a) introduced five levels of evaluation, Figure 2.6, he felt were necessary in order to give a true picture of the effectiveness of the program.

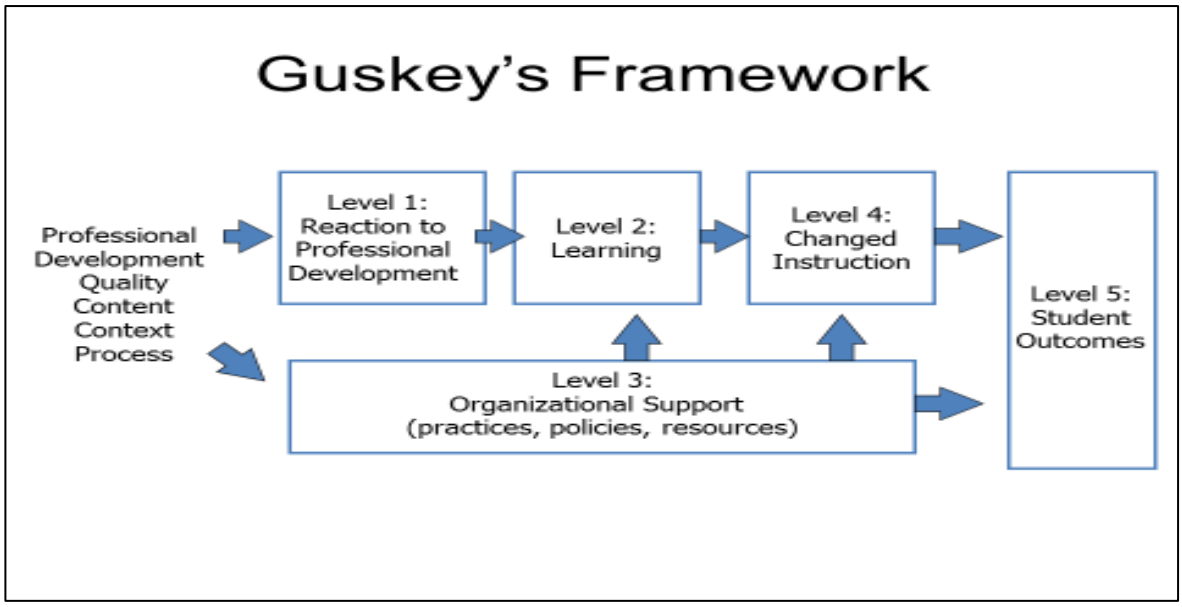

Figure 2.6. Guskey's Evaluation Model. Adapted from "Does it make a difference? Evaluating professional development" by T. R. Guskey, 2002a, March, *Educational Leadership, 59*(6), 45-51.

- Level 1 – Gathering information around the participants' reactions to the PL experience. Not only is this about the degree to which participants enjoyed the PL experience, but it specifically garners information about the comfort of the room or types of refreshments.
- Level 2 – Collecting data from the participants about their learning. This is typically done in survey form, but information could also be gathered via interview or a focus group.

- Level 3 – Gather information about organizational support and change. This level underlies levels 1, 2, and 4 because in order for teachers to be successful, they must have the support of the administration in terms of the practices, policies, and resources needed for a successful PL experience.
- Level 4 – Evaluate how the participants are using the new knowledge and/or skills. Here again, a questionnaire or survey could be used as well as visits to the classroom and focus group interviews.
- Level 5 – Measure the impact of the PL on student learning outcomes. Many forms of data could be used to collect evidence. The focus here is that the PL must be evaluated to establish the impact on student achievement.

Guskey elucidated that tying PL to measure one outcome, such as student success or teacher satisfaction, cannot be the only tool used in an evaluation (King, 2014). "It is also important to understand the complexity of teacher learning and teacher change to know how to support the link between teacher engagement and pupil outcomes" (King, 2014, p. 90). Guskey believed that these levels had three implications for evaluating PL. First, information must be obtained at each level, as each level is important and necessary. Second, unlike Hall and Horde's eight level model, in which an educator may never progress through all levels, all participants will move through Guskey's five levels.

Therefore, Guskey's model can be used as an effective evaluation tool. Guskey (2002a) understood that it would take time and planning to facilitate the participants' progress, so tracking effectiveness at each level was important. The third, and arguably the most important component, involved using backward design in planning PD activities so that the educator could determine the desired outcome before the PD is planned (Guskey,

2002a). The Guskey model is the preferred evaluation model of the researcher to be used to evaluate SLL as an innovative, job-embedded peer observation program.

Differences Between Professional Development and Professional Learning

"If schools are to change to meet their increasingly urgent needs, teachers will have to move from being trained or developed to becoming active learners" (Easton, 2008, p. 755). Easton (2008) described learning and PD as a throwback to the industrial model of education where training is essentially inflicted on teachers by someone else (Easton, 2008). PL, on the other hand, involves peer observation, coaching and mentoring, and collaboration that can happen at various times during the school day. It is a model in which the teachers are inherently involved in constructing the learning (Easton, 2008). Stewart (2014) further asserted that the reform movements focus on tying teacher PL with student achievement has caused a shift in how PL viewed as well as given it momentum for the future. Stewart (2014) concurred with Easton that education has made a "shift from passive and intermittent PD to that which is active, consistent, based in the teaching environment, and supported by peers in a professional learning community (PLC)" (p. 28). Timperley (2011) extended the thinking on PL by posting that student achievement is not a byproduct of PL, but rather the reason for its existence. In her book, *Realizing the Power of Professional Learning*, Timperley (2011) identified five principles that shift the idea of teacher training from PD to PL:

1. PD has connotations of something being delivered to the teachers whereas PL implies the teachers create knowledge intrinsically through activities in which they are seriously engaged.
2. Student achievement is the central purpose of PL.

3. Knowledge gained as a result of PD, was generic or could only be applied to a specific group of students regardless of the teachers' content area. PL knowledge is constructed through activities, such as peer observation, coaching, collaboration etc. Which activity selected by the teacher is not as integral to the learning as much as the knowledge and skills acquired during the process.
4. PL is inquiry-based knowledge into effective practices. The steps taken can be different for each educator.
5. The final shift in thinking is the idea that PL must involve reflection. The teacher must reflect on the effect of PL on student outcomes and adjust future PL opportunities based on those reflections.

The concept of moving from PD to PL is important when evaluating the SLL program and its effectiveness with the subjects involved in the study.

Job-Embedded Professional Learning

Traditionally, the U.S. education system is focused on standards-based assessment aimed at achieving higher test scores; however, effective PL activities have not been created that can develop and sustain the kind of teaching required to increase the capacity for learning (Darling-Hammond & McCloskey, 2008). Several studies have linked higher levels of student success with sustained PL linked to the content and curriculum (Darling-Hammond & McCloskey, 2008). JEPL allows for the type of intensive, ongoing, learning, connected to the teacher's practice, researchers feel can increase teacher pedagogy as well as raise student achievement.

JEPL can be described as an endeavor in which teachers learn from one another in the context of their own school and daily activities (Hamilton, 2012). This definition is in

contrast with what Hamilton calls extracted PD, a practice in which outside experts or people unfamiliar with the school, culture, or needs of the students impart their knowledge onto the teachers. Effective JEPL allows educators to model and observe best practice, construct opportunities for learning, and reflect and collaborate with their peers in a sustained and prolonged dialogue (Darling-Hammond & Richardson, 2009). This idea is important because "The most powerful learning is that which occurs in response to challenges currently being faced by the learner and that allows for immediate application, experimentation, and adaption on the job" (Darling-Hammond & Richardson, 2009, p. 52). Borko (2004) also championed JEPL as it allows the teachers to not only experience but also apply what they are learning in the context of their school or classroom.

Billet (2001) supported Darling-Hammond and Richardson's statements on effective PL when he described how JEPL models work in the contexts of the educators' own schools allowing them to see their everyday work as the central component to effective and continuous PL. Allen and Topolka-Jorissen (2014) believed JEPL was the key to promoting collaborative work that can build teacher capacity within a school. Darling-Hammond and McLaughlin (1995) claimed that JEPL possesses the following characteristics:

1. It engages teachers in the concrete tasks of teaching, assessing, observing and reflecting;
2. It is grounded in inquiry, reflection, and experimentation;
3. It is collaborative among teachers with a focus on the community of practice and not on the individual teacher;
4. It is connected to and derived from the teachers' work with students;

5. It is sustained, ongoing, intensive, and supported by modeling, coaching, and the collective solving of problems of practice;
6. It is connected to other aspects of school change. (p. 598)

These characteristics echo aspects of both adult learning theory and Vygotsky's (1978) social constructivist theory in that teachers are controlling their learning as well as connecting in collaborative groups to apply their knowledge and learn from one another. Camburn (2010) also supported these theories in respect to JEPL when he stated, "Knowledge about teaching that is acquired in teachers' immediate work context (their classroom and the larger school organization) may be more readily applied than knowledge acquired outside that context" (p. 466). There are many types of PL that take place in the JEPL environment to support teachers. Some common and effective examples are provided in Table 2.1.

Table 2.1

Examples of Job-Embedded Professional Learning

Format	Description
Coaching	A coach provides consistent support to a teacher through demonstration teaching, observations of teachers, and reflective conversations.
Mentoring	A teacher is matched with a teacher of the same content or grade level in order to provide support to include the personal and non-academic aspects of the profession.
Professional Learning Communities (PLC)	Teachers collaborate together to analyze their practice and learn about new teaching techniques. PLCs create a shared responsibility for all students.
Peer Observation	Teachers spend time in other teachers' classrooms observing instructional strategies, behavior management, classroom layout, or any other behaviors in an effort to expand their knowledge and practice

Adapted from *Job-embedded professional development: What is it, who is responsible, and how to get it done* by A. Croft et al., 2010.

The SLL program supported JEPL because peer observation is a form of JEPL as a topic of action research; it is inherently involved in the coaching process; it can be used as a tool for mentoring; and it helps to create the relationships, trust and analyzation of teaching practices needed in successful PLCs.

Professional Learning vs. Personalized Professional Learning

Personalized learning is often discussed when referring to teaching students; however, this concept is important when discussing adult learning as well (Gleason & Gerzon, 2013). "Teachers must be understood as professionals and individuals with particular strengths and passions and must be able to develop personal goals that dovetail with school goals and desired student outcomes" (Gleason & Gerzon, 2013, p .33). Personalized professional learning means the educator is in control of his/her learning opportunities as well as the way in which that learning is received (Foote, 2013). It is important to understand that all professional learning is not necessarily personalized. For example, the administrator may require a teacher to observe a peer as part of a growth plan. The learning that comes from that activity is a form of PL that occurs through a job-embedded environment; however, it was not due to self-reflection by the teacher. In order for something to be characterized as PPL, it must be professional learning that is reflected by and designed by the teacher. Ultimately all PPL, is professional learning, but not all professional learning is PPL.

Examples of PPL can occur in JEPL activities like PLCs, coaching, mentoring, and peer observation; however, in 21st century learning, technology can play a large role in PPL. Teachers can use Twitter, webinars, livestreams of a conference session of choice, or skyping with a peer in another state or country (Foote, 2013). Regardless of the mode of

learning the teacher chooses to conduct the PL experience, PPL gives teachers the voice, choice, and opportunity to tailor the experience to address unique learning needs (Mosley, 2015).

Professional learning community. Conventional PD in the United States has historically focused only on learning to become a better teacher. Many districts and principals contracted outside experts to come to campuses to aid in the journey. Traditional PD frequently involved teachers attending workshops off campus to enhance their practice. PL, by contrast, is a collaborative, reflective process during which peers learn from one another in real-time. PLCs have become a driving engine in that shift to collaborative learning. PLCs allow teachers to build trusting relationships with their learning partners. In 2010, Darling-Hammond et al. stated:

> Unlike the typically ineffective one-shot workshops that proliferate, effective professional learning is sustained, ongoing, content-focused, and embedded in professional learning communities where teachers work, over time, on a problem of practice with other teachers in their subject area or school. (p. 226)

Lave and Wenger (1991) described how teachers should learn from and with their peers in what they called a "community of practice" and what we call PLCs. PLCs provide an opportunity for teachers to share their experiences, work, learn, and grow together (Burke, 2000). This is the time where collaborating teachers develop the trust that is so important to the success of PLCs.

According to Schmoker (2004), former educator and consultant, "The most promising strategy for sustained, substantive school improvement is building the capacity

of school personnel to function as a professional learning community" (p. 424). The administrators and leaders must design the master schedule with common planning times and PL opportunities to support this model of learning. If the school supports individual teacher self-reflection and analysis with increased teacher talk among peers, PLCs can be successful (Zepeda, 1999). Goos, Galbraith, and Renshaw (2002) took a Vygotskian perspective when they said, "There is learning potential in peer groups . . . each partner possessing some knowledge and skill but requiring others' contribution in order to make progress" (p. 195).

Sandt's (2012) research discussed how peer observation disrupts the isolation teachers felt in the past and moves them toward PLCs where they can initiate reflective practice with their peers and simultaneously gain support. There is other research that supports that effective professional learning opportunities should enable teachers to operate as a community of professionals who come together to study curriculum and instructional initiatives that are successful in improving student learning (Darling-Hammond et al., 2010; Dufour et al., 2006; Joyce & Showers, 2002). The idea of PLCs contributes to the success of JEPL programs such as peer coaching and peer observation.

Peer coaching. There are many types of JEPL that involve collaboration; however, the one designed specifically to foster development and acclimation of instructional strategies directly in the classroom is peer coaching (Joyce & Showers, 1982). Showers (1985) described the purpose of peer coaching "to build communities of teachers who continually engage in the study of their craft, an interactive, reciprocal relationship among professionals" (p. 4). Peer coaching is a continuous PL model that stipulates that two or more teachers work together to improve their teaching and expand their pedagogical

knowledge (Huston & Weaver, 2008). Coaching can occur in one of two ways. The first style occurs when an on-site professional developer, called an instructional coach, partners with one or more teachers in JEPL activities designed to empower teachers to incorporate research-based instructional methods into their classrooms (Knight, 2007). The second model of coaching involves a mutual consultation between teachers of equal status (Murray, Ma, & Mazur, 2009) who agree to work together to improve their practice. This could occur in PLCs, instructional teams, a mentoring situation, or a natural result of collaboration between two colleagues. Peer coaches may use observation as a tool to help teachers improve classroom management, perfect specific teaching practices, develop formative assessment, or a means by which improve instruction (Knight, 2007). It can be a powerful form of JEPL if the teacher transfers the knowledge and skills gained from the experience directly into the classroom (Joyce & Showers, 2002).

In a study by Murray et al. (2009), the researchers found that the participants in a coaching program found value in sharing ideas, techniques, and instructional strategies; giving and receiving reciprocal feedback from peers; as well as the support they felt when working in collaborative groups (p. 209). Sandt (2012) stated that "research in the context of peer coaching shows that if peer observation is not embedded in continuous professional development, it does not seem to stimulate reflective practice" (p. 358). In an extensive study by Greene (2004), research results indicated that teachers enjoy planning in a coaching environment; the research further found that instructional coaches who made frequent peer observations were viewed in a more positive light. On the flip side, there were some limitations to successful coaching such as time, scheduling, and teacher resistance (Greene, 2004).

Peer mentoring. Peer mentoring can be defined as a situation between two educators where the more experienced teacher is a mentor and the less experienced teacher is a protégé (Murray et al., 2009). The mentor can observe, evaluate, and assist the protégé without fear of judgement or disappointment (Bynum, 2015). The experience is advantageous for both participants. The mentor establishes a connection to a peer and must reflect about his or her own practice in order to model; the mentor also gains valuable leadership experience. The protégé also establishes a connection to a peer, builds self-confidence, learns to become reflective, and begins to understand the importance of professional growth that can lead to increased teacher retention (Bynum, 2015). Bynum identified both a formal mentoring partnership and an informal one. In the formal partnership, the mentor is assigned; the informal approach is spontaneous and not monitored by the administration (Bynum, 2015). Clark and Byrnes (2012) recommended that mentors and protégés are scheduled with a common conference time for collaboration, that partners teach the same or similar subjects, and that partners are given time to observe each other as well as other teachers. The mentor/protégé relationship will be different with every paring that occurs, so it is important that mentors tailor their support to their mentees goals, needs, and expectations as matter of PPL (Kissau & King, 2014).

Peer Observation

"Evidence is increasingly emerging that learning from watching a colleague teach can be just as beneficial as, if not more than, receiving feedback" (Hendry & Oliver, 2012, p. 1). Sharing experiences through peer observation provides teachers a common ground on which to base professional and instructional conversations (Schuck, Aubusson, & Buchanan, 2008). However, those conversations are only effective if the teachers are

willing to develop relationships, are willing to take risks, and are willing to respect each other enough to reflect collaboratively (Pressick-Kilborn & Riele, 2008). Once that trust is built, sometimes within the confines of a PLC, peer observation can stimulate confidence in a teacher as well as promote reflective thinking (Weller, 2009).

Like peer mentoring, peer observation is also an important aspect of peer coaching, PPL, and JEPL. Peer observation is a form of JEPL that is intensive, ongoing, and connected to practice as well as focused on the teaching and learning of specfic academic content (Loucks-Horsley et al., 2010). This observation can include professional learning required by an administrator or, it can be part of the teacher's own PPL plan. Either way, peer observation always takes place in a JEPL enviroment. Peer observation can be defined as two or more teachers participating in collegial classroom observations to enable each teacher to learn from one another in the context of their daily class schedule (Roberts & Pruitt, 2009).

Desimone (2011) believed that observing other classrooms and being observed can provide some of the most influential PL teachers can experience. Pressick-Kilborn and Riele (2008) stated, "Peer observation is perhaps the most challenging mode of collegial involvement in one another's teaching" (p. 62). However, teachers find value in "frequent and regular feedback from walkthroughs, observations, and instructional rounds" (Marzano, Schooling, & Toth, 2010, p. 7). A 2016 study also stressed the importance for secondary teachers to have interactions within and across different subject areas to gain knowledge and skills in general pedagogical knowledge (Louis & Lee, 2016). The study was focused on identifying key elements of school culture and the effects they have on the teacher's ability to gain and act on new information (Louis & Lee, 2016). The authors

defined this as organizational learning. The researchers discovered that as the level of school increased from elementary, to middle, to high school, the ability of the teachers to assimilate new learning decreased (Louis & Lee, 2016). The authors also concluded that in order for a school or a teacher to show continuous improvement, there must be "frequent and deliberate adjustments of classroom practice in response to new ideas" (Louis & Lee, 2016, p. 536). Therefore, it is important for teachers to observe and collaborate with each other in order to support a school culture that is open to organizational learning (Louis & Lee, 2016). All these examples of professional learning models highlight the fact that teachers need to take responsibility for their learning and be proactive and involved in the methods in which the learning takes place (Sandt, 2012).

Historical Context for Peer Observation

In understanding the genesis of how peer observation evolved, it is prudent to look at the past and follow the path education traversed to arrive at its present state. In regard to peer observation as a form of JEPL, historically, one can look to situated learning theory, which holds that learning is not about transmission of knowledge from one to another in a decontextualized environment, such as one-day PD workshops, but is embedded within the context as it normally occurs (Amendum, 2014; Brown, Collins, & Duguid, 1989). Lave and Wenger (1991) described situated learning theory as one where teacher learning would occur while they are engaged in their teaching, in real time, with students present, otherwise known as an authentic context.

Some educators and researchers feel the original goal of professional development was to remedy the issue of unqualified and uncertified teachers (Harris, 2004). However, that original PD model did not differentiate for teachers of varying subject matter or

experience (Reeves, 2009). Offsite PD or learning from experts is disconnected from practice and ultimately sets the teacher up for failure since there is no model for application in the classroom (Hargreaves, 1994). Moving teachers out of the isolated silos and teaching solitude of the past and into a more interactive and engagement focused practice of the future is what teacher professional learning should become (DuFour et al, 2006).

The Quincy method, developed in 1875, provides a snapshot into the origins of professional development. Quincy is a town in Massachusetts that believed in the power of change. Method, as defined in Quincy, is not a fixed or finished way of doing things; it is not stagnate, but rather it is personal, ever changing, and ever improving (Parker, 1900). The citizens of Quincy believed, in the words of the 21st century, in teacher collaboration, peer observation, reading to learn, and many other forms of professional learning in use today. In the early 1900s, finding teachers with the required two years of training at a teachers' college proved to be difficult in rural areas of the country (Dakin, 1914). Therefore, many states set up model schools and placed at least one master teacher in the rural school to serve as a mentor and a classroom open for observation. The model school became a prototypical plan in not only rural schools, but in suburban and urban areas as well (Dakin, 1914). The benefits of supervisory visits, monthly teacher meetings, and teacher observations not only proved successful in training beginning teachers, but also improved experienced teachers as well (Dakin, 1914).

Before World War I, students in American schools were highly selective and comprised of a group that represented a narrow socio-economic and intellectual level. In the 1920s, it became an expectation that public schools educate children from every socio-

economic class, every social status, and every level of intellectual ability. “It is a vastly different problem to teach all of the children than to teach those who want to learn” (Jessup, 1921, p. 33). This changed the process by which in-service teachers were developed to meet this new need. Model schools were either replaced or augmented with collegial teacher institutes, summer programs, and laboratory schools, as a means to improve teachers in-service (Deffenbaugh, 1925). In Virginia and New York, teachers were granted a sabbatical year to study and observe other teachers as a means for improving their skills; however, few teachers took advantage of this type of professional development (Deffenbaugh, 1925).

In the 1930s, teacher institutes morphed into demonstrative programs whereby teachers would observe a master teacher demonstrating a lesson (Reinhardt, 1930). The lesson was not given in real-time or presented to actual students, but the lesson was simply as a means for other teachers to observe and learn new techniques (Reinhardt, 1930). Classroom visits by supervisors also became more frequent post-WWI, and administrators would arrange for lesson demonstrations for the staff performed by either the principal, superintendent, or master teachers (Garretson, 1931). However, Garretson (1931) noted, that 63% of high schools in Oklahoma provided for inter-visitation of classes among their teachers as well as 56% providing for visitation in classes of other schools by their teachers. This trend in observing other teachers had not been embraced by the school community at large as an effective means of in service teacher training according to a national study in 1932 (Mayhew, 1932). The same issues involving observation of others are the same today as they were a century ago. Mankiewicz (1938) reinforced this idea when he stated, “teachers hesitate to visit colleagues or to receive their visits” (p. 148).

Mankiewicz believed the value of visiting other teachers is immeasurable and should be required of all teachers.

In the late 50s and early 60s, the literature concerning in-service training began to change. Curtis (1958) stated that "research has reported, but rarely focused upon, isolating and attempting to determine the relative value of course content, methods of instruction, . . . and in-service procedures as related to assisting the teacher" (p. 217). At this point in history, in-service training programs were prevalent across the nation in both large and small school systems (Taylor, 1958). In addition to the options utilized in previous generations, peer observation began to take advantage of modern technology available at that time. Films were being made and distributed through mass media to provide an opportunity to observe model teachers and model lessons as a means for teachers to improve their technique (Langeveld, 1962).

Collaboration became a key term in the 1970s to describe effective in-service training. Although collaborative efforts were consistently utilized in the past, the naming of the movement emerged, and the concept of collaboration is still considered essential to teacher development (Davies & Aquino, 1975). By 1975, the United States had approximately 4,500 teacher centers devoted to continuing professional development (Davies & Aquino, 1975). These centers are analogous to the teacher institutes of the past. However, most classroom observations were still conducted in a supervisory role or through videotaped lessons as opposed to a job-embedded growth activity for teachers (Lawrence & Branch, 1978). Texas Tech University began using peer observation in 1973 as a means by which the professors in the College of Education could assess, analyze, and modify instruction (Skoog, 1980). In his research, Skoog (1980) posited that professors

gained access to valuable data and expert assistance from their peers as well as forming supportive relationships with deep discussions about pedagogy resulting from the observations. Videotaping was also used in 1975 as a way for peers to observe and learn from one another due to time constraints in public school settings (Brown & Kameen, 1975). Peer observation can be rooted in Vygotsky's (1978) social constructivist theory that learning takes place through multiple social interactions. He believed that learning helped a person grow by challenging him through engagement with others rather than through individual knowledge (Wise & Jacobo, 2010).

Moving into the 1980s, Vygotsky's influence can be seen in the literature by Joyce and Showers in which peer observation manifests itself in their peer coaching model. Their interest was in researching the voracity in which skills acquired through training were implemented in the classroom (Joyce & Showers, 1982). Their review of literature and previous studies showed very little information related to "coaching to application" (Joyce & Showers, 1982). Glatthorn (1987) likened peer observation to peer coaching and peer supervision in 1987; he rejected the term peer supervision "because it seems self-contradictory, peer suggest equals, supervision connotes superiority" (p. 33). Glatthorn (1987) further posited that peer observation is different from peer coaching because coaching begins with a theoretical study, then moves to teacher observations and culminates in practice and feedback of a single model of teaching. He described peer observation as "a process by which small teams of teachers use the essential components of clinical supervision to help each other grow professionally" (Glatthorn, 1987, p. 33). Many colleges and universities all over the world began to embrace peer observation as part of a clinical supervision model to improve teaching. Onyefulu (2013) stated that "peer

observation of teaching has been a long-standing practice in many universities in the United States and Australia, although it is a relatively recent practice in universities in the UK" (p. 102).

The goal of teacher development became more focused in the 1990s, as a result of the Nation at Risk report. It was at this time that PD began to explore why and what needed to change for teachers rather than how a group of participants learn and then implement improvements (Cole, 2004). Teachers continued to enter each other's classrooms in an early version of job-embedded peer observation now known as learning walks/peer observation. Allen and Topolka-Jorissen (as cited in Senge, 1990) believed that Senge provided a base for learning walks and peer observation so teachers could experience education beyond the walls of their classrooms. Senge (1990) reinforced his ideas with the belief that an organization's commitment to, and capacity for, learning cannot be greater than that of its members. "Research, in the context of professional development in schools, demonstrates strong potential for community building" (Sandt, 2012, p. 358). Learning walks initially brought more teachers into other teacher's classrooms; however, a shift occurred that tied the observations and collaborations to improving student performance rather than focusing on teacher competency (Christen & Hasbrouck, 1995). To support this, PLCs were established as a vehicle for teachers in peer coaching/peer observation situations to reflect and exchange ideas (Ackland, 1991). What peers learned from observing others through coaching and observing, however, had yet to be truly identified and explained thoroughly in the research and literature (Desforges, 1995).

The literature in the 21st century exploded around the idea of peer observation. Darling-Hammond (2000) found several studies showing that higher levels of student achievement are associated with teachers' opportunities to participate in sustained professional development grounded in content-specific pedagogy linked to the curriculum they are learning to teach. Yet, most studies do not include a great deal of research related to the peer observation component (Zwart, Wubbels, Bolhuis, & Bergen, 2008). Those that do "highlight the positive potential of peer observation for staff development" (Sandt, 2012, p. 357). Hamilton (2012) concurred that "currently, within the context of the U.S., there is little research available regarding one specific job-embedded professional development model, namely peer-to-peer observations" (p. 43). Cosh (1999) also agreed there are few peer observation models connected to JEPL for the K-12 setting. It is important to look at the past to understand the history of education and professional learning. Thus, there is a need for this study to evaluate the effectiveness of SLL, a job-embedded campus PL initiative focused on peer observation for STEM teachers. The results of this study will add to the depth and breadth of the literature concerning this topic.

Significant Studies Relating to Peer Observation

An early study by Brown and Kameen (1975) used videotape to improve the competence of individual teachers under the assumption that teachers want and need feedback not only from an outside source, but from their peers as well. All but two of the participants agreed to have portions of their videos viewed and discussed by a collegial group of their peers in order to understand and learn the art of instruction. The study results showed an increase in measured competencies of the participants and the conclusions of the study attributed the growth to the viewing and discussing the lessons as well as

receiving specific instruction on observation and feedback mechanisms (Brown & Kameen, 1975). A 1974 study by Blumberg had similar results that are illustrated in the quotes from the teachers; after the peer observation program was implemented in their school, the teachers felt more at ease in being observed, asking others for advice, no longer changing their teaching style when someone walked in the room, and fear or worry had lessened concerning supervision (Ellis, Smith, & Abbott, 1979).

A 1984 study in rural Tennessee developed a peer coaching model, whereby the participants used a checklist of effective teaching, developed at Tennessee Technological University, to provide feedback to one other after their observations (Phelps & Wright, 1986). The results showed teachers had increased confidence in their abilities, enhanced self-evaluation in planning and teaching, developed positive and trusting relationships with their peers, as well as enjoyed increased student success (Phelps & Wright, 1986). A reciprocal peer coaching program was implemented in a public school in Illinois in 1985 to promote growth of effective classroom instruction, facilitate a teacher exchange of methods and materials, provide a mechanism for positive feedback on classroom performance, and develop methods to enhance student learning (Munro & Elliot, 1987). The study of the program showed an achievement in the desired outcomes stated above. Some teams began writing lessons and tests together; other teams aligned their instruction to teach coordinated concepts concurrently, while many others commented on the dissipation of anxiety related to classroom observations (Munro & Elliot, 1987). The detractors to the program, similar to the ones conducted in the 1970s, explained that shortage of time was a constraint. This study also concurred with the Brown and Kameen

study in that some type of planned training on methods of observation and feedback was needed to help the teachers feel more comfortable (Munro & Elliot, 1987).

A study by Courneya, Pratt, and Collins (2008) revealed a lack of teacher training in how to effectively observe peers and demonstrated a need for training so educators could transcend previous conceptions about the teachers' ability as well as how to best learn from the peer observation experience. The basis for the study was Pratt's 1992 study in which he described five significant teaching conceptions, one of which was apprenticeship. In his study of 250 teachers from all over the world, Pratt (1992) found that teachers preferred learning to be contextual rather than delivered in a contrived environment such as PD or a classroom with lecture. Courneya et al's (2008) study echoed the 1992 findings when they specifically focused on peer observation.

Sandt performed an action research project in 2012 to study the contributions of a peer observation program in increasing teacher collaboration and personal growth at a public high school. Both qualitative and quantitative data in his study positively linked peer observation to reflective practice as well as PLCs. Teachers agreed that it was an effective means for personalized professional development. However, concerns arose that the observation may be used for a purpose other than collaborative, such as a performance evaluation.

The purpose of Hamilton's (2012) study was to understand what teachers experienced with peer observations as well as how to construct an effective JEPL initiative using the data gained in the study. The data showed peer observation increased collegial awareness and respect because the staff realized that experts existed in their own building. The teachers also enjoyed the aspect of choice the program offered them, a sense of control

in what and how they wanted to improve as professionals. This echoes Knowles' (1980) characteristics of an adult learner. One participant's thoughts were a summation of many when she stated, "when we are actively involved in our learning, we are more likely to apply what we learn" (Hamilton, 2012, p. 51).

Allen and Topolka-Jorissen's (2014) study revealed their school benefitted from increased student engagement due to peer observation because observation broke down the isolation teachers experience and encouraged teacher connection and collaboration. This connection ultimately enhanced their lessons. "Teachers visited each other's classrooms and observed their colleagues using effective instructional strategies, they became open to trying new or long-forgotten techniques" (Allen & Topolka-Jorissen, 2014, p. 829). The initial purpose of the study was to explore administration and staff perceptions of the program approximately one year after it was implemented on the campus to evaluate the effectiveness. The findings show observations of other teachers helped the school build capacity among campus staff, increased pedagogical knowledge, aided in classroom management techniques, and increased the overall commitment to learning on the campus (Allen & Topolka-Jorissen, 2014).

Concerns Relating to Peer Observation

Murray et al's (2009) study showed "although post-observation conference involved social interaction among peer partners, there was [no] evidence of true collaboration" (p. 209). This study echoed many of the previous studies in that teachers must be taught how to observe and collaborate with one another. The SLL case study measured the effectiveness of moving teacher collaboration out of team meetings that occur in workrooms and move it into classrooms, with students, in real time. Peer

observation programs lacking reflection opportunities for teachers can produce fragmented and short lived experiences (Hamilton, 2012) if they do not provide the sustained, long term collaboration of peers needed to be effective (Darling-Hammond & McLaughlin, 1995). Sandt's (2012) study showed while teachers see vast potential in peer observation, there is an aspect of fear of being judged that plays into the experience. Teachers also believed that observation may interfere with a teacher's autonomy in the classroom. "The mere presence of an observer in the classroom in an intrusion into the private space of the observed teacher" (Sandt, 2012, p. 363). Teachers also become anxious when peer observation becomes part of the evaluation process (Sandt, 2012). These are all valid concerns and ones that must be addressed if a school is to have a successful peer observation program.

History of SLL at RHS

RHS implemented SLL in January 2013 as a voluntary peer observation program open to the entire campus. The program is a type of JEPL that allows peers an opportunity to apply the best practices, recommend by Hamilton (2012), of learning from each other in real time with similar students in campus based, individualized learning environment. It is learning that is not required by the district or the campus. Staff members are not told what classrooms they should observe. Instead, they are encouraged to reflect on their own instructional needs and seek out peers who may exemplify and illustrate how to overcome those shortcomings in a live classroom environment. SLL is truly a personalized, peer-to-peer observation program to meet the needs of teachers by observing those with the same student base and district/school resources. It is not about learning what other educators have done in other districts or stated whose problems, students, or resources may be

distinctly different from their own. Based on data from RHS, 31 of 165 teachers volunteered to be part of the pilot program. Figure 2.7 shows the breakdown of the initial participants and the departments they represent. It is important to note STEM represented the departments with the most voluntary participants in SLL. STEM comprises 33% of the overall teaching staff at RHS; however, it made up 55% of the SLL pilot teachers. This fact makes them the logical department to research for the purposes of the evaluation study as they will have teachers who have had multiple experiences with the SLL program as well as new teachers to the school who have yet to experience SLL.

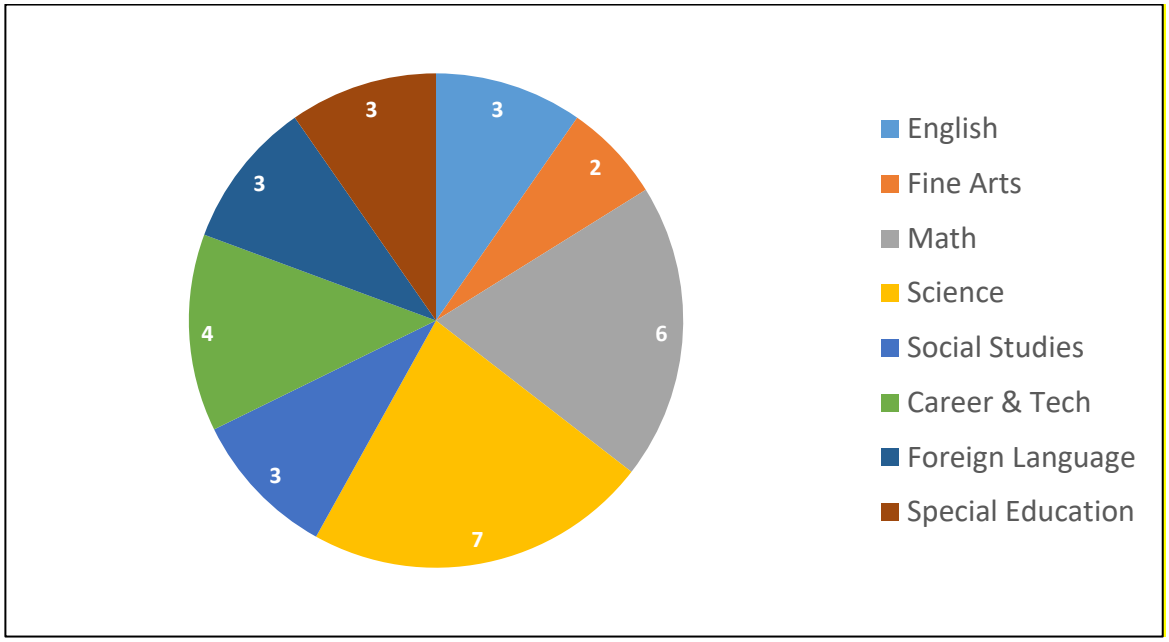

Figure 2.7. RHS SLL Pilot Participants, 2013.

The teachers performed their observations from February through April 2014 and were each asked to complete an anonymous survey after one of their visits. One hundred percent of the participants, 31 of 31, responded to the survey; 87% stated they learned a new teaching strategy during the observation, and 100% of participants stated it was a

positive experience. One teacher commented in the survey that "*the observation was enlightening,*" while another stated "*it was stimulating,*" and a third thought it was "*an excellent way to learn*." As part of the initial program, a voluntary survey was used to gather data on the SLL initiative (Appendix A); however, since that time, no formal evaluation of the program has occurred. Results from the 2014 survey showed:

- There were 31 out of an unknown number of observations who chose to complete the Google form survey.
- There were 22 of 31 or 71% specifically looking at other classrooms to observe technology integration. This was a district initiative at that time.
- When asked if the participant "got out of the observation what you were looking for?" 27 of 31, 87% said yes.
- There were 31 of 31 or 100% who thought the SLL experience was positive.
- There were 26 of 31 or 84% who answered yes when asked if they learned any new strategies that could be used in their own classroom.

Based on the feedback from the pilot program, the administration and site-based decision-making team decided to continue the program for the 2014-2015 school year. However, during its first full year of implementation, no formal documentation of participants was recorded. There were also no surveys performed to aid the campus in evaluating or improving the program. In the 2015-2016 school year, SLL was required for all teachers as a result of an action team that was addressing PL needs on campus. Therefore, 100% of all teachers at RHS participated in SLL; yet, no formal evaluation of the program has occurred.

Conclusion

Traditionally teachers have had very few opportunities to observe and learn from one another. However, in today's world of PL, teachers have come to expect PD that relates to their work, involves feedback and collaboration from colleagues, and allows them to be self-directed and responsible for their learning (Hunzicker, 2012). PL occurs in a variety of different formats and a range of subject areas and topics; yet, is believed to be the single greatest factor for influencing student achievement today (Guskey, 2002b). Knowles' (1980) adult learning theory holds true that people will attach more value to their learning if they gain it through experience rather than passively. Evaluating the effectiveness of the peer observation program, SLL, is the purpose of this study and is important to the students and staff at RHS.

CHAPTER III

METHODOLOGY

The purpose of this record of study was to evaluate how STOP Light Learning meets the professional learning needs of STEM teachers as an innovative, job-embedded peer observation program in a southwestern high school. A case study approach was selected for this study as it is focused on one unit, RHS, and the results may not be transferrable to other campuses or learning environments (Flybjerg, 2011). Institutional Review Board (IRB) approval for this study was granted by Texas A&M University by email from the Director of Online Ed.D. in Curriculum and Instruction in the Department of Teaching, Learning & Culture, Dr. Carol Stuessy (Appendix B). The study itself may be "useful in the preliminary stages of an investigation since it provides hypotheses, which may be tested systematically with a larger number of cases" (Flybjerg, 2011, p. 301). It occurred in real time, in real classrooms, with existing teachers and students, supporting Opfer and Peddler's (2011) research that stated that there were four avenues in which professional learning could have an impact on teacher's learning:

- When the PL can be applied in teaching and learning
- When the PL occurs through actual field and classroom experiences
- When the teachers are given time to reflect
- When teachers are given a secure environment

The researcher examined the effectiveness of the SLL program measured through statistical analysis, a quantitative measure, using descriptive statistics looking for improvements or suggestions to the program (Cresswell, 2011). Case study is usually

reserved for qualitative research; however, there are many theories of study that view the "case study as a method to define cases and not as a method describing how to analyze cases" (Gog, 2015, p. 36). Both Gerring and Stake believed it could be looked upon as a research strategy that could be adequately analyzed quantitatively (Gog, 2015). Survey was the preferred quantitative instrument in this study to reduce the influential effect the researcher may have had on the study. Other qualitative methods were considered, such as focus group or interviews; however, since the researcher was also the campus principal, a quantitative approach was deemed most appropriate. A surrogate was used throughout the study to act in place of the researcher to allay the effects the principal could have on the responses of the participants. A web questionnaire, through SurveyMonkey, was employed since it was considered the most objective type of survey and would mitigate interviewer bias (Göttfert, 2015). This survey was distributed to the participants by the surrogate. The surrogate also pulled the data from the survey and ensured that any identifiable markers were removed before it was handed over to the researcher for analysis. A quantitative case study was also the preferred method for the study because "the ideal research question of a case study identifies 'how' or 'why' events occur and that are beyond the control of the researcher" (Göttfert, 2015). Case study is applicable if:

- There is a cause and effect relationship dealing with real-life events
- An event occurs in its actual environment
- An evaluation is pursued
- Situational outcomes are unclear
- It is the assessment of an evaluation study. (Göttfert, 2015)

The “how” nature of the overarching research question, the study occurring in real-time, and the fact that it is an evaluation study, leads further credence to the method of a quantitative case study. Data were quantified through the use of pre- and post-survey analysis to establish a representation of what teachers think or feel about the SLL program based on Guskey’s first four levels (Barnham, 2015) .

After two years of piloting and using SLL, it is time for the next generation of evaluation, which is a quantitative analysis of the worthiness of the program. Now that it is no longer a pilot program, it must be formally evaluated to (a) determine whether to continue the program and (b) determine how to improve the program, should it be renewed. This type of self-study, by educators, is becoming increasingly more common as it is necessary in order to provide new insights on issues affecting education (Chang et al, 2016). “Teachers have different aims and different dilemmas at various moments in their professional cycle, and their desires to reach out for more information, knowledge, expertise and technical competence will vary accordingly” (Huberman, 1995, p. 193). Self-study deepens current understanding of the SLL program and helps quantitatively define what we, at RHS, know and what we do not know about the effectiveness of the program. It will also aid the administration in assisting teachers in designing their own personalized professional learning to meet their individual needs as they gain experience in the field of education and reflect on the areas where they can improve.

Participants

The participants in the study were high school STEM teachers currently employed by RISD at RHS. It is important to note that the STEM teachers were chosen for this study because of the growing concern that the United States is falling behind other nations in this area and that it is a threat to the economic stability and global competitiveness of our nation (Stearns et al., 2012) Due to this concern, professional development for STEM teachers is becoming a focus for education; however, there is little research examining the effectiveness of these programs (Stearns et al., 2012). This study adds to the literature in this area as it is an evaluation of a STEM PL program as well as helping teachers better prepare 21st century learners for careers in the STEM fields. Participation in the study was voluntary and was initiated by the researcher through campus email. The subjects taught by the participants ranged in grades from 9-12 and in subjects from biology, chemistry, physics, algebra, geometry, calculus, robotics, and engineering. The sample consisted of teachers who had previously participated in peer observation through the SLL program as well as new teachers to RHS who had no experience with SLL. Thirty of the 48 STEM teachers agreed to be part of this study and all had valid Texas teaching certificates in the areas they taught. The students in their classes ranged from grades 9-12. The classes include advanced placement, regular, special education inclusion, English as a second language sheltered classes, as well as the special education (SPED) life skills setting. The students were predominantly from middle-class, suburban households. Table 3.1 provides a demographic profile of the study participants as well as the ethnicity distributions of the students in their STEM classes.

Table 3.1

Teacher Demographic Profile and STEM Student Ethnicity

Department	Ethnicity	Class	Level	Years Exp.	Degree	Gender	SLL Exp.	Asian (A)	Af. American (AA)	Hispanic (H)	White (W)	Other	Total Students
CTE	W	Computer Applications	R	19	M	F	Y	16%	15%	28%	26%	15%	68
CTE	W	Digital Graphics	R	7	B	M	N	16%	12%	31%	33%	8%	121
CTE	W	Robotics	A	8	M	M	Y	26%	7%	26%	38%	2%	42
CTE	H	Computer Science	A	11	M	F	Y	29%	8%	20%	32%	11%	154
CTE	AA	Health Science Technology	R	4	B	F	Y	36%	12%	22%	23%	7%	74
CTE	W	Engineering	A	3	B	M	N	16%	4%	25%	45%	10%	89
CTE	W	Engineering	A	16	B	F	N	30%	4%	27%	37%	2%	90
CTE	W	Audio/Visual Productions	R	18	M	F	Y	6%	14%	42%	26%	11%	111
CTE	W	HST	R	6	B	F	Y	21%	16%	24%	27%	12%	160
CTE	W	Audio/Visual Productions	R	7	M	M	Y	14%	10%	45%	31%	0%	42
Math	W	Alg. II	R	1	B	M	N	13%	13%	28%	40%	6%	95
Math	A	Calculus	A	10	M	M	Y	26%	4%	19%	42%	9%	115
Math	W	Geometry	R	3	B	M	Y	23%	10%	29%	28%	9%	116
Math	W	Alg. II	R	1	B	F	N	4%	14%	38%	34%	10%	142
Math	W	Alg. I	A	1	B	M	N	12%	6%	24%	46%	13%	152
Math	W	Alg. I	R	16	M	F	Y	7%	18%	34%	32%	9%	100
Math	W	Alg. II	A	26	M	F	Y	25%	5%	17%	40%	14%	133
Math	H	Pre-Calculus	R	6	B	F	N	7%	15%	32%	33%	13%	165
Science	W	Chemistry	A	16	B	F	Y	33%	5%	17%	36%	9%	145
Science	W	AP Biology	A	10	M	F	Y	40%	4%	21%	31%	4%	182
Science	W	Aquatic Science	R	8	B	F	Y	22%	7%	25%	46%	0%	122
Science	W	Biology	A	8	B	F	N	18%	8%	26%	36%	13%	159
Science	W	Biology	R	12	B	F	Y	9%	16%	29%	29%	17%	146
Science	H	Biology	R	10	B	M	N	11%	13%	37%	20%	19%	139
Science	W	Chemistry	A	14	M	F	Y	31%	7%	22%	29%	12%	137
Science	H	Physics	R	7	M	F	Y	14%	12%	36%	31%	7%	155
SPED	AA	SPED Geometry	RS	9	M	M	Y	0%	15%	46%	31%	8%	13
SPED	W	SPED Math	LS	4	B	F	Y	29%	12%	29%	24%	6%	17
SPED	W	SPED Alg. I	RS	13	M	M	Y	4%	11%	48%	26%	11%	27
SPED	W	SPED Bio	RS	20	B	F	Y	25%	8%	26%	31%	9%	122

Note. A – Advanced R – Regular RS – Resource LS – Life Skills

No regular education or advanced teacher has more than 46% of any ethnicity as seen in the aquatic science teachers' classes as well as one of the algebra I teachers' classes. In the special education area, two teachers had a distribution of 46% Hispanic in SPED geometry and 48% Hispanic in SPED algebra I. There was an underrepresentation of African American students in many of the advanced classes such as calculus, AP biology, and engineering with each at 4%. Conversely, those classes also showed an overrepresentation of Asian students with the percentages ranging from 26% in calculus to 40% in AP biology.

Setting

RHS is a suburban school located in the southeast region of Texas in RISD. The area encompassing and surrounding the school district is a science-rich area encompassing medical professionals, oil and gas researchers and engineers, as well as those with an interest in the space industry. According to the Texas Education Agency (TEA, 2015) 2014-2015 Texas Academic Performance Report (TAPR), RHS had a total of 154 teachers, 47 of whom taught STEM courses.

Methods

This quantitative study employed a quasi-experimental design utilizing survey as the primary source to answer the research questions concerning the effectiveness of the SLL program at RHS. All teachers in the STEM departments at RHS were recruited to participate in the study. Only individuals who volunteered served as participants in the SLL effectiveness study. The study itself consisted of three activities: (a) a pre-observation survey for baseline data collection, (b) a period for teachers to conduct two SLL peer

observations, and (c) a post-observation survey. The four steps of the study are outlined in Figure 3.1.

- Step 1 of 4: Pre-Observation Meeting – The surrogate for the researcher met with participants to explain the study and release the protocol for peer observations (Appendix C). During this meeting, conducted by the surrogate at RHS, participants were instructed in specific "look fors" that were recorded on the observation reflection sheet (Appendix D). An example of some of these are: (a) classroom management, (b) attention to access, (c) equity, (d) diversity, (e) involvement of all students, (f) use of assessment in instruction, and (g) overall reflections of the observer.

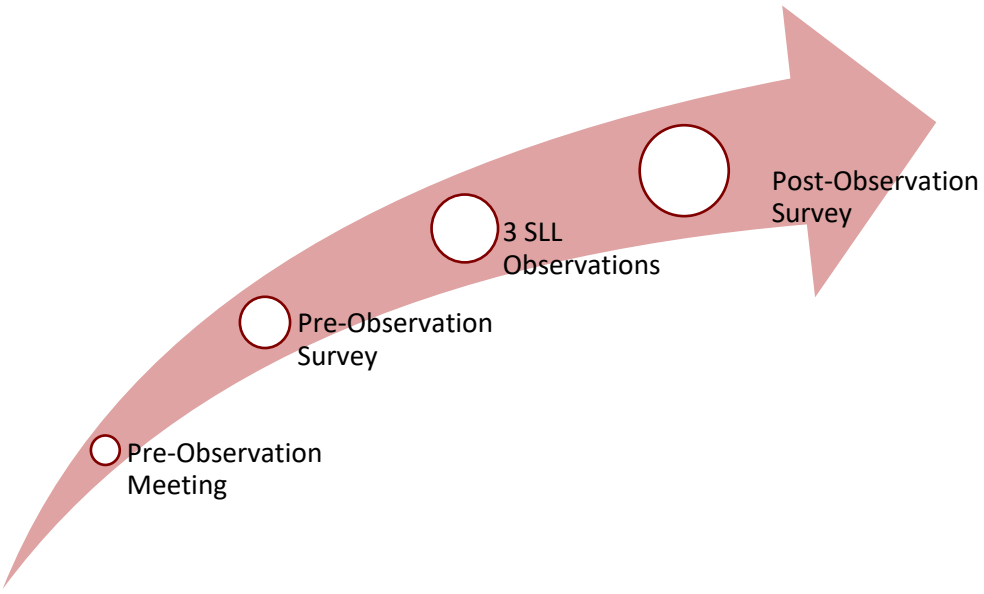

Figure 3.1. Steps of the SLL Study.

- Step 2 of 4: Pre-Observation Survey – Twenty-eight of the 30 participants completed a pre-observation survey that was distributed through the surrogate using SurveyMonkey (Appendix E). Participants were notified via district

email, by the surrogate, the information related to the survey, the link for the survey, and the timeline in which it should be completed. The survey should not have taken more than 10 minutes to complete. Data were collected by the surrogate, identifying markers were removed by the surrogate, and it was sent to the researcher for use in analysis once the study had been completed.

- Step 3 of 4: Observation – The peer observation portion of the study required the participants to perform SLL peer observations in two different classes for a period of 10-15 minutes each when it was convenient for their schedule, but within the timeframe outlined in the study. The participants were prompted, by the surrogate, when they received the study instructions, to reflect on areas in their own practice where improvement was needed and look for those traits when observing others. It is important to note that this step was essential to the methodology of this study; the data gathered from the teachers' reflections of their observations contributed to the evidence used to answer the research questions. The participants were trained in the SLL protocol during the pre-observation meeting to remind those who had previously participated in the program and to train those new to the campus. The observation instrument was created by the researcher by using elements from two of the five observation protocols used in the MET project funded by the Bill & Melinda Gates Foundation (Kane & Staiger, 2012). The two instruments were the Charlotte Danielson Framework for Teaching and the UTeach Teacher Observation Protocol (UTOP) (Kane & Staiger, 2012). Elements from the Danielson framework were selected because the new Texas Teacher Evaluation Support

System, T-TESS, is based on her model and is currently in use at RHS. The UTOP system was also selected for use as a resource in creating the observation reflection document because it has a focus on observing STEM classrooms and teachers, as does this study (Kane & Staiger, 2012).

It is important to describe how the SLL observations took place. Teachers who participated in the study received a red sheet of paper, a yellow sheet of paper, and a green sheet of paper. These sheets were hung outside the teachers the room and indicated, to anyone who would like to observe, if that teacher was open for observation on any given day. The colors indicate:

1. Green – A green sheet posted outside the classroom indicated the teacher was open to anyone who would like to observe.
2. Yellow – Yellow was an invitation to observe, but it let the observer know the teacher was trying something new so they were not sure if the lesson would go as smoothly as planned.
3. Red – A red sheet was notification that the teacher preferred not to be observed on that day. It could be a test day, the teacher may be having a bad day, or any reason.

The teachers controlled the colors outside the room, so they could feel comfortable trying new teaching strategies as well as controlling the frequency of observation visits. A map of the school was given to all study participants indicating which classrooms agreed to be part of the study. The map did not indicate the colors posted on any given day, but rather directed the participants

to the classrooms, the subjects taught within those classrooms, and the periods the teachers were available for a STEM observation (Appendix D).

- Step 4 of 4: Post-Observation Survey – Participants completed a post-observation survey (Appendix F). This survey was tied to an adaptation of Guskey's (2002a) evaluation model in order to provide data for assessment of the SLL program. When creating the survey, it was important to craft each question to measure one of the four levels in Guskey's model. The researcher also ensured that 20% of the questions on the survey represented each level. The pre and post-observation surveys were created by the researcher and tested for reliability and validity using Cronbach's alpha. Alpha was created by Cronbach to provide a test of internal consistency that would be expressed as a number between 0 and 1 (Tavakol & Dennick, 2011). Cronbach's alpha is often used in educational research as it only requires an administration of the survey to measure reliability, or internal consistency, of the study (Tavakol & Dennick, 2011). It is important in this study because it shows the extent to which the survey questions measure the same concept, or "put simply, this interpretation of reliability is the correlation of the test with itself" (Tavakol & Dennick, 2011, p. 53). If the questions on the survey are correlated to each other, the alpha score will be high, or close to one. As the score gets closer to zero and further from one, then the Cronbach's alpha is showing the test items are not correlated. However, in addition to the reliability test, the study, including the questions, were presented to a panel of district level administrators outside the research school to review and refine as well as evaluate the alignment to the

adaptation of Guskey's first four levels of evaluation. Resources for the researcher included Dr. Stephen Ebell, Deputy Superintendent; Dr. Robert Bayard, Chief Technical Officer; and Dr. Debbie Phillips, Executive Director for Curriculum and Instruction. The surveys, formatted with the Likert scale, were a valuable tool as they provided the data for quantitative statistical analysis. Numbers 1-5 were assigned to each question in the surveys in order to characterize and measure Guskey's four levels of evaluation as described in Table 3.2. Again, the surrogate collected these data, removed identifying markers, and sent the information to the researcher for analysis.

- Level 1 – Participant reaction addressed the physical and emotional feelings about the experience with questions like: "Did the participant feel that time was well spent?" or "Were the activities well planned and meaningful?" (Guskey, 2002a, p. 48). It could also address the temperature of the room or the comfort of the chairs. The purpose is to assess the participants' overall satisfaction with the PL experience.
- Level 2 – Participant learning addressed such questions as: "Are the participants using what they learned?" and "Is it having an impact in their lesson design and implementation in the classroom?" Information from this level can be used "as a basis for improving content, format, and organization of the program or activities" (Guskey, 2002a, p. 47).

Table 3.2

Guskey's Five Levels of Professional Development Evaluation

Evaluation Level	What Questions are Addressed?	How will Information be Gathered	What is Measured or Assessed?	How will Information be Used?
Participants' Reactions	Did they like it? Will it be useful? Were the refreshments tasty? Were the chairs comfortable?	Questionnaires administered at the end of the session	Initial satisfaction with the experience	To improve program design and delivery
Participants' Learning	Did the participants acquire the intended knowledge and skills?	Participant reflections (oral/written) Simulations Demonstrations	New knowledge and skills of participants	To improve program content, format, and organization
Organization Support & Change	Were sufficient resources made available? Was implementation advocated, facilitated, and supported? What was the impact on the organization? Did it affect the organization's climate and procedures?	Questionnaires Minutes from follow up meetings Structured interviews District and school records	The organizations advocacy, support, accommodation, facilitation, and recognition	To document and improve organization support To inform future change efforts
Participants' Use of New Knowledge and Skills	Did participants effectively apply the new knowledge and skills?	Questionnaires Structured interviews Participant reflections (oral/written) Direct observations	Degree and quality of implementation	To document and improve the implementation of program content
Student Learning Outcomes	What was the impact on students? Did it affect student performance or achievement? Are students more confident as learners?	Questionnaires Student records School records Structured interviews	Student learning outcomes: Cognitive, affective, and psychomotor	Focus and improve all aspects of program design, implementation, follow-up, and the overall impact of PL

Adapted from "Does it make a difference? Evaluating professional development" by T. R. Guskey, 2002a, March, *Educational Leadership, 59*(6), 48.

- Level 3 – Organizational Support and Change reminded the reader that an effective PL experience can become inert if the administration and school

policies do not support the change. Guskey (2002a) felt this level was as important to assess as the other so the efforts of the teacher were not thwarted by organization itself. Information gathered from this part of the study could be used to inform future initiatives involving change as well as improving support from the organization (Guskey, 2002a).

- Level 4 – Participants' use of new knowledge and skills asked such questions as: "Did you use your new knowledge in the classroom?" and "Do you plan on using anything you learned through this PL in your classroom in the future?" This information is important in the evaluation of any PL program so future programs can be restructured if needed or to aid in more consistent implementation of new knowledge and ideas (Guskey, 2002a).
- Level 5 – Student learning outcomes are not addressed in this study. However, extensions and expansion of the study in the future could include student learning outcomes as an option.

The post-observation survey also provided the participants the opportunity to express their opinions and allowed the researcher to quantify the data concerning the research questions: How does SLL compare to other PL opportunities provided to STEM teachers at RHS by the campus and the district? Should RHS continue to embrace SLL as an option for personalized learning among STEM teachers? How would the STEM teachers at RHS improve or change the SLL program at RHS?

Two data collection devices spanning a period of four weeks in the spring semester of 2017 were used for analysis in this study. The data collection began in March and was completed in April of 2017, as illustrated in Table 3.3.

Table 3.3

Timeline of Data Collection and Methods

Date of Collection	Method	Validation
3/3/2017	Secured participants for the study	RHS currently had 48 STEM teachers. Participation in the study was voluntary; however, the goal was to have at least 30 participants.
3/29/2017	Conducted Pre-Observation Survey (Data Collection Step)	Provided a snapshot of numerical baseline data so that a comparison could be made at the end of the study.
3/29/2017	Met with participants to explain study and release protocol for peer observations (Data Collection Step)	This step was necessary to ensure participants knew and understood the timeline, activities, purpose, and guidelines of the study.
3/30/2017 – 4/13/2017	Subjects completed 2 SLL observations	This a JEPL activity that took place during the participant's conference period so that they could learn from their peers in real time, with actual students, in their own environment
4/14/2017 – 4/19/2017	Conducted Post-Observation Survey (Data Collection Step)	The survey provided quantitative data that were to be used to measure the effectiveness of the SLL program and answer the research questions.

Data Analysis

Descriptive statistics were used to provide simple summaries of the survey information and practical significance of the data (Ferguson, 2009). The results from the surveys were analyzed to describe the data's central tendencies. Data were also collected at the Pre-Observation Meeting to gain information from the participants about the subjects they taught, the periods they were available for observation, and the demographics of the classes in which the teachers observed (Table 3.4).

Table 3.4

Data Analysis Methods

Data Collection Method	Method of Data Analysis
Pre-Observation Meeting	Quantitative – Descriptive statistics (Ferguson, 2009)
Pre-Observation Survey	Quantitative – Descriptive statistics (Ferguson, 2009)
Post-Observation Survey	Quantitative – Descriptive statistics (Ferguson, 2009)

Analysis of Pre-Observation Data

Both surveys were constructed using the Likert scale in order to determine participant reactions and preferences. The pre-observation survey collected data regarding the participant's preferences and experiences in relation to the types of PL programs attended in the past, the value placed on collaborative learning, and other facets of professional learning that aided the researcher in determining the effectiveness of the SLL program. Statements from the pre-observation survey included:

- I believe mentoring another teacher will improve my teaching practice.
- I believe that the longer I am a teacher, the less professional learning I need.
- I believe that other STEM teachers can improve by observing my classroom.

The Pre-Observation Survey also included participant demographic data, such as the numbers of years' experience and the highest degree earned so these data could be used in the analysis of the study.

Analysis of Post-Observation Data

The post-observation survey was slightly different than the pre-observation survey. The first section of the survey, containing the professional learning statements described, above remained the same. This enabled the researcher to gather pre- and post-data to establish changes in teacher perception about varying types of PL and the benefits found in them to answer Research Question 1. A specific SLL program evaluation section was created in the post-observation survey. The statements are directly aligned to four of Guskey's five levels of evaluation to answer Research Question 2. Examples of statements and their alignment include:

- SLL is a more effective vehicle for JEPL than other activities provided by RISD. (3)
- I believe the SLL program is an effective way for all STEM teachers to improve instruction. (1)
- I believe the SLL program has helped me improve my teaching ability. (2)
- I have been able to apply learning from my SLL observations immediately in my classroom activities and lesson plans. (4)

The last section of the post-observation survey used for data analysis is the short answer section. These questions gave the participants an opportunity to express their thoughts and feelings about the experience each question directly related to one of the three research questions. These data collection instruments were important in answering each research question as illustrated in Table 3.5.

Table 3.5

Methods of Investigating Research Questions

Research Question	Measuring Tool(s)
How do STEM teachers at RHS rate the quality of their SLL experiences as compared to other professional learning experiences provided by the campus and the district?	Comparison of Pre-Observation and Post-Observation Survey - Pre-Observation Meeting demographic analysis
Do the STEM teachers at RHS believe that SLL should continue as an option for personalized learning? How would the STEM teachers at RHS improve or change the SLL program at RHS?	Post-Observation Survey SLL questions aligned to Guskey's first four levels - Pre-Observation Meeting demographic analysis Post-Observation Survey and Pre-Observation Meeting demographic analysis
Overarching Question: How does STOP Light Learning meet the professional learning needs of STEM teachers as an innovative, job-embedded, peer observation program in a southwestern high school?	Comparison of Pre-Observation and Post-Observation Survey - Pre-Observation Meeting demographic analysis

Limitations

The researcher identified 10 limitations that she believed were significant in this study:

1. The researcher was the principal of the school and was concerned that she could influence the teachers' participation or responses to the program. The participants were only identifiable to her as the principal, at an initial meeting to explain the activities of the study. Beyond that, all undertakings were confidential and anonymous.
2. The survey was created by the researcher and, therefore, was not tested for reliability and validity.
3. The sample size of teachers, 30, was relatively small.

4. Research was being conducted in a comparatively short timeframe of six weeks.
5. The study included only the STEM teachers on campus.
6. There could also be bias in the results since the teachers were voluntarily participating in the SLL study, and the results could have been based on previous experiences with peer observation.
7. The staff was cognizant of the fact that the researcher was the originator of the SLL program, and because of that, may have been hesitant to express any negative thoughts or feelings.
8. The SLL study was limited in that it was specifically designed to evaluate its effectiveness at RHS. The results of the study were not transferrable to different campuses and may not be indicative of other departments at RHS. However, the study could be reproduced in various settings to ascertain the effectiveness of the program in those areas or expanded campus-wide at RHS in the future.
9. Using only quantitative data also limited the study. More data could have been gained from a mixed-methods or qualitative study in order to measure the effectiveness of the SLL program.
10. The case study did not measure the impact on student achievement, but rather student participation, which added to the study's limitations. Further investigation would be needed to measure the impact on achievement.

Qualifications of Researcher

I have been a public-school educator for 23 years, 18 of which have been at the administrative level. I have a Bachelor of Science degree from Texas A&M University and

a master's in Educational Administration from the University of Houston Clear Lake. I have been a high school head principal for 12 years. In that time, I have coordinated many professional learning opportunities and I have performed hundreds of teacher observations. As a teacher, I taught Biology and Advanced Placement Biology as well as coached numerous sports including varsity volleyball. I am a product of the district in which I have worked; I spent 4th through 12th grades as a student and I graduated from one of the other six high schools in the district. Three of my five years of teaching occurred at RHS in the mid-1990s. The doctoral work I have participated in at Texas A&M University over the past five years has also prepared me to construct and implement this study.

As principal of the campus in which the research took place, it was necessary for me to minimize my impact on the staff regarding this study. My only contact with the staff was in the initial recruitment of the study. Once the participants were established, a surrogate resumed the duties of facilitating the study to mitigate any potential influence I could have on the participants. My goal, as a researcher and educator, was to find an effective, job-embedded professional learning program where teachers could learn, reflect, and collaborate with one another to enhance their teaching to increase student success. Evaluating the effectiveness of SLL with STEM teachers on campus was just a small step in the process of achieving that goal.

CHAPTER IV

PRESENTATION OF FINDINGS

Introduction

This chapter presents the research findings of the STOP (Successful Teacher Observation Protocol) Light Learning (SLL) peer observation program evaluation in order to accomplish two primary objectives: (a) to assess how SLL compares to other district and campus science, technology, engineering, and math (STEM) professional learning (PL) opportunities and (b) to determine if the program should continue and, if so, how the observation program can be changed or improved. The SLL peer observation program is a creative PL strategy, designed by the researcher, which has been in effect at Redwood High School (RHS) for three years without a formal program evaluation. It is vital for the improvement of our educational system that teachers engage in formalized, structured activities, such as peer observation, that are embedded in the classroom rather than work in isolated silos (Roesken-Winter et al., 2015). This quantitative case study was initiated, designed, and implemented to answer the following overarching research question: How does STOP Light Learning meet the professional learning needs of STEM teachers as an innovative, job-embedded, peer observation program in a southwestern high school? The three questions that guided the study are:

1. How do STEM teachers at RHS rate the quality of their SLL experiences as compared to other professional learning experiences provided by the campus and the district?

2. Do the STEM teachers at RHS believe that SLL should continue as an option for personalized learning?
3. How would the STEM teachers at RHS improve or change the SLL program at RHS?

Informal information at RHS showed teachers saw value in observing others; however, there was a need for a structured observation protocol to enable them to engage in the activity. Although SLL had been in place on campus for three years, no formal evaluation or mechanism for teacher input had taken place. This study provided STEM teachers an opportunity to experience peer observation in real time, with other teachers participating in the program. It also gave them a voice and input on the continuation of the program and any changes needed for improvement. Thorough program evaluation, which is essential to an effective professional learning initiative, is consistently missing in public schools in the United States (Ofsted, 2006). Therefore, this study is necessary to not only improve the SLL program at RHS, but to provide the teachers with sustained, continuous PL that research states is necessary to improve them as a teacher and impact the success of their students (Darling-Hammond et al., 2010).

Research Methodology

The study was a quantitative case study; meaning, the study occurred at one location, RHS, and the participants were not selected at random. Instead, they were recruited from the schools STEM department as volunteers (Flybjerg, 2011). A statistical analysis method was employed using descriptive statistics to evaluate the case study (Cresswell, 2011). A pre- and post-survey method was selected for this study to reduce the impact of the principal as the researcher. A measure to mitigate the influence of the

principal was to use a surrogate to help recruit participants, administer the study, and collect the results to ensure consistency and anonymity throughout the study. Data were then analyzed, compared, and studied in relation to the first four of Guskey's five levels of evaluation to answer the research questions stated above (Barnham, 2015). Table 4.1 outlines each research question and the designated portions of the survey designed to answer those questions.

Table 4.1 *Research Question Alignment to Guskey's First Four Levels*

Research Question	Measuring Tool(s)
1. How do STEM teachers at RHS rate the quality of their SLL experiences as compared to other professional learning experiences provided by the campus and the district?	Comparison of first 20 questions of Pre-Observation and Post-Observation Survey. Post-Observation Survey short answer question 22.
2. Do the STEM teachers at RHS believe that SLL should continue as an option for personalized learning?	Post-Observation Survey SLL evaluation 20 questions aligned to Guskey's first four levels. Post-Observation Survey short answer question 23.
3. How would the STEM teachers at RHS improve or change the SLL program at RHS?	Post-Observation Survey short answer question 21.

By the end of April 2017, the participants had completed a pre-observation survey, two SLL peer observations, and a post-observation survey. The purpose of the pre-survey was to establish a baseline of teacher perceptions concerning traditional professional development (PD), collaborative learning, and job-embedded professional learning (JEPL) in order to analyze results to answer Research Question 1. The survey contained 7 questions to gather data regarding the participants' demographics as well as 20 questions relating to the previously cited PL themes. The post-survey contained the same 20 questions relating to Research Question 1 as well as 20 questions relating to Research Question 2, specifically evaluating the SLL program. The post-survey concluded with

three open-ended questions each pertaining to one of the three research questions. Both surveys were anonymous, completed through SurveyMonkey, and administered by a surrogate, Cynthia Peltier, the special education director at Redwood Independent School District (RISD). Mrs. Peltier was responsible for overseeing district level special education staff as well as all special education and 504 programming for RISD. She did not work directly with the STEM teachers at RHS.

Presentation of the Data

The information in this section has been organized by question themes and presents the findings of the pre- and post-surveys side by side to aide in the analysis of the data (Appendix G). The demographic data of the participants are reported according to the pre-survey results. Those results are followed by survey questions as they pertain to each of the three research questions. The data obtained from the pre- and post-survey are accompanied by an analysis of the findings as it pertains to each research question, including commentary and discussion on how those findings relate to prior research in the field and connect to the work of prominent scholars.

The data were organized around four themes and the impact SLL had on the teachers' thinking or practice around those themes. The four themes consisted of:

1. Traditional Professional Development
2. Teacher Collaboration
3. Job-embedded Professional Learning
4. Teacher Choice and Continuing Education

Christopher Day (2012) noted it is important to learn about teacher similarities and differences as they move through their professional life phases in order to provide insights

and supports for educators, so they can have resiliency in the workplace and remain in the field of education. The data from this study and the themes that they were designed around will look at commonalities and differences among and between teachers in various phases of their career.

The observation surveys were designed using the Likert scale with the questions addressing the following categories to answer Research Question 1: Traditional PD – 4 questions; collaborative learning – 5 questions; JEPL – 5 questions; teacher voice/choice and continuous learning – 6 questions. Twenty-eight of the 30 participants completed the pre-observation survey. Of these, 10, or 36%, were male and 18, or 64%, were female. The majority of the teachers (57%), as seen in Table 4.2, have been in education between 6 and 15 years with only one teacher identified as in their first year of teaching and one with more than 25 years teaching. Teachers with a bachelor's degree comprised 15, or 54%, of the participants while those with a master's degree made up the remaining 13, or 46%.

Table 4.2

Group Frequency Distribution for Teaching Years of Experience

Years' Experience	**Frequency**	**Percentage (%)**
First Year	1	4
2-5 years	4	14
6-15 years	16	57
16-25 years	6	21
More than 25 years	1	4
Total	28	100

Ethnicity data of the teachers involved in the study were collected during the pre-observation meeting as well as the type of STEM classes taught. However, because these data were not included in the survey and the survey was anonymous, teacher ethnicity analysis, student ethnic distribution analysis, and course analysis could not be included in this study. Table 4.3 shows the participant ethnicity, male to female ratio, and the departments the STEM teachers represent. These data were presented comparing the teachers who volunteered to participate in the SLL study as opposed to all who were eligible as RHS STEM teachers. When asked how many hours of traditional PD, Table 4.3, the participants engaged in during the past year, 67% reported between 0-40 hours. Additionally, when asked about engagement in JEPL activities over the course of the past year, 75% stated between 0-40 hours. Of the 28 respondents, 75%, or 21, had previously participated in SLL activities at RHS while 7, or 25%, experienced this type of PL for the first time.

Findings for Research Question 1

For the purposes of answering Research Question 1 concerning how STEM teachers at RHS rate the quality of their SLL experiences as compared to other personalized learning experiences provided by the campus and the district, it is important to present the results in the four categories listed above so they can be analyzed for evaluation.

Table 4.3

SLL STEM Participant Demographics and PD Participation

	SLL Study Participants	**All STEM Teachers @ RHS**
Ethnicity		
African American	2	4
Asian	1	2
Hispanic	5	5
White	20	37
Gender		
Male	10	21
Female	18	27
Department		
Science	13	17
Math	10	20
Career, Technology, & Engineering	5	11
	Traditional PD %	**JEPL %**
Participant PD Experience		
0-20 hours	30	29
21-40 hours	37	46
41-60 hours	15	18
61-80 hours	11	4
80+ hours	7	4

Traditional PD. Traditional PD is characterized by learning that takes place in isolated settings, outside of the classroom, and is typically generalized for a large population of educators who may teach different age levels or subjects (Croft et al., 2010). Table 4.4 presents the mean score and standard deviations (*SD*) for the pre- and post-survey questions relating to traditional PD. The mean score for these questions were either unchanged or raised when comparing the pre-survey to the post-survey. The data show teachers do not want school administrators deciding their PD; however, they do find value in some traditional PD activities such as conferences, workshops, or guest speakers. A mean score of 2.5 on S14 shows many do not think their best PL occurs on isolated in-service days.

Table 4.4

Teacher PL Perceptions Regarding Traditional PD Pre- and Post-Survey Results

	Pre-/Post-Survey Questions	**Pre-Mean**	**Pre-*SD***	**Post-Mean**	**Post-*SD***	**Δ**
S1	Conferences and workshops will improve my teaching practices (on subject matter, methods, or other instructional topics).	3.9	0.91	4.1	0.73	0.2
S8	I believe the school and administration should decide and plan all professional learning opportunities for the staff.	2.2	0.94	2.2	0.71	0.0
S13	Listening to a guest speaker or expert will improve my teaching practice.	3.1	0.74	3.4	0.57	0.3
S14	The best profession leaning experiences occur as isolated events such as teacher in-service days.	2.5	0.84	2.6	0.86	0.1
	Total Mean	2.9		3.1		

Rankings: 5 – Strongly Agree, 4 – Agree, 3 – Neutral, 2 – Disagree, 1 – Strongly Disagree

When looking at these questions as a group, the mean rose from 2.9 to 3.1, showing participation in SLL could have had a positive effect on the teachers' overall view of PL regardless of the method. This finding is significant in understanding that there is "no fixed route to be followed in professional development" (Van der Klink, Kools, Avissar, White, & Sakata, 2017, p. 164).

> Rather than asking that teachers drop old practices and adopt new ones in a short period of time, effective change agents develop ways for teachers to gradually cross the bridge into new territory, adopting new practices while still engaging in familiar ones. (Allen & Topolka-Jorissen, 2014, p. 823)

The teachers at RHS still find value in traditional forms of PD and can learn from them as they transition to more effective types of PL that engage "teachers in learning activities that are supportive, job-embedded, instructionally focused, collaborative, and ongoing" (Hunzicker, 2011, p. 177). Value can be found in that the teachers looked more positively on any type of PL after engaging in SLL peer observations than before. The data here support the idea that change is slow and should evolve over a period of time.

Collaboration. Public school teachers in the 21st century have come to expect teacher collaboration as a necessity in effective PL, as it allows them to be self-directed, to learn from their colleagues, and be responsible for their own learning (Hunzicker, 2012). This SLL case study is important because it is working to move teacher collaboration out of after-school team meetings and encouraging teachers to engage in an ongoing process of inquiry that takes place in classrooms, in real time, with students present (DuFour et al., 2006). Table 4.5 presents the mean and standard deviations for the pre- and post-survey questions relating to Collaborative PL. Here again, the mean for these questions were either unchanged or raised when comparing the pre-survey to the post-survey; however, the average was much higher than that of traditional PD indicating the teachers put more value on this type of PL. Learning from other teachers was ranked as the highest value with a mean of 4.5 on the pre-survey with teacher collaboration taking the top spot in the post-survey with a mean of 4.7.

Table 4.5

Teacher PL Perceptions Regarding Collaboration Pre- and Post-Survey Results

	Pre-/Post-Survey Questions	**Pre-Mean**	**Pre-*SD***	**Post-Mean**	**Post-*SD***	**Δ**
S3	Participation in a teacher study group will improve my teaching practice (ex. Book study/lesson study).	3.8	0.88	3.9	0.53	0.1
S4	I find value in receiving feedback from my peers.	4.2	0.93	4.5	0.51	0.3
S6	I believe participation in a teacher network structured around professional learning will improve my teaching practice.	4.2	0.98	4.2	0.66	0.0
S15	I believe that teacher collaboration is a powerful tool for professional learning.	4.4	0.98	4.7	0.48	0.3
S19	I believe that I can learn from other teachers at RHS.	4.5	0.98	4.6	0.5	0.1
	TOTAL MEAN	4.2		4.4		

Rankings: 5 - Strongly Agree, 4 – Agree, 3 – Neutral, 2 – Disagree, 1 – Strongly Disagree

These data support previous research that stated, “The most promising strategy for sustained, substantive school improvement is building the capacity of school personnel to function as a professional learning community” (Schmoker, 2004, p. 424). Collaboration is a key component of PLCs. These data in Table 4.5 show teachers at RHS understood the importance of collaboration and that “there is learning potential in peer groups . . . each partner possessing some knowledge and skill but requiring others’ contributions in order to make progress” (Goos et al., 2002, p. 195). When teachers come together to collaborate as a community of professionals, they are “more cohesive, have higher morale, and are more responsive to initiatives from one another and from administrative leadership than faculties whose members work in isolation” (Joyce & Showers, 2002, p. 146). SLL provides

teachers with another vehicle in which this important collaboration among educators can occur.

JEPL. As collaboration is an important part of JEPL, the survey also evaluated the participant's pre-conceived notions about job-embedded opportunities for learning. It is important to state that JEPL is a relatively new type of PL at RHS and RISD that has come to fruition in the past three years. Another important factor is that in the STEM department, the science and math teachers have had access to an instructional coach for the past two years, but the technology and engineering teachers have not. Table 4.6 presents the mean and standard deviations for the pre- and post-survey questions relating to JEPL. Perceptions on JEPL seem unchanged due to the SLL observation study. The mean changed by .1, either higher or lower, on every question in this category. That being said, teachers believe peer observation will improve their practice as evidence by a mean of 4.2. Mentoring another teacher and working with a coach as a form of JEPL both garnered a mean of 3.8, which indicates the teachers looked positively on this practice, though not as strongly as peer observation as a means of personalized professional learning.

The data in Table 4.6 illustrate that the RHS STEM teachers are beginning to realize "the most powerful learning is that which occurs in response to challenges currently being faced by the learner and that allows for immediate application, experimentation, and adaption on the job" (Darling-Hammond & Richardson, 2009, p. 52). They understand the value of job-embedded learning opportunities and are open to engaging in them. Of all the JEPL opportunities surveyed in this study, teachers scored peer observation the highest. This is supported by literature stating, "Evidence is increasingly emerging that learning

from watching a colleague teach can be just as beneficial as, if not more than, receiving feedback" (Hendry & Oliver, 2012, p. 1).

Table 4.6

Teacher PL Perceptions Regarding JEPL Pre- and Post-Survey Results

	Pre-/Post-Survey Questions	**Pre-Mean**	**Pre-*SD***	**Post-Mean**	**Post-*SD***	**Δ**
S5	I believe that peer observation will improve my teaching practice.	4.1	0.88	4.2	0.66	0.1
S7	I learn best when professional learning occurs during instruction in the regular school day.	3.6	0.78	3.5	0.96	-0.1
S9	I believe mentoring another teacher will improve my teaching practice.	3.9	0.88	3.8	0.76	-0.1
S10	I believe that the RISD coaching model will improve my teaching practice.	3.7	0.91	3.8	0.58	0.1
S11	I believe that other STEM teachers can improve by observing my classroom.	3.7	0.89	3.7	0.74	0
	TOTAL MEAN	3.8		3.8		

Note. Rankings: 5 – Strongly Agree, 4 – Agree, 3 – Neutral, 2 – Disagree, 1 – Strongly Disagree

Teacher choice and continuing education. The final category analyzed through the pre- and post-surveys was teacher choice in PL as well as the need for continuing education throughout their teaching career. Table 4.7 presents the mean and standard deviations for the pre- and post-survey questions relating to choice and continuing education. Overall, teachers' views on this subject were only slightly influenced by the SLL study, which is indicated by a change in overall mean of .1. The first four questions in this section dealing with choice all scored very high with a mean of 4.5, 4, 4.4, and 4.3, respectively, indicating a strong agreement with the statements. Interestingly, teachers did

not agree that educators should continue to use researched-based best practices throughout their career with the mean changing from an already low figure of 2.3 to 1.9.

Table 4.7

Teacher PL Perceptions Regarding Teacher Choice and Continuing Education Pre- and Post-Survey Results

	Pre-/Post-Survey Questions	**Pre-Mean**	**Pre-*SD***	**Post-Mean**	**Post-*SD***	**Δ**
S2	When learning, I prefer to have a choice in the topic.	4.5	1.09	4.6	0.57	0.1
S12	When learning, I prefer to have a choice in the method of delivery of the information.	4	1.01	4.3	0.68	0.32
S16	I prefer professional learning activities that can be immediately adapted to my classroom.	4.4	0.98	4.5	0.51	0.04
S17	I believe teachers have the ability to drive their own professional learning.	4.3	1	4.5	0.59	0.21
S18	Teachers must continue to learn researched based best practices throughout their career.	2.3	0.93	1.9	0.67	-0.43
S20	I believe that the longer I am a teacher, the less professional learning I need.	3.9	0.92	4.2	0.76	0.34
	TOTAL MEAN	3.9		4.0		

Rankings: 5 – Strongly Agree, 4 – Agree, 3 – Neutral, 2 – Disagree, 1 – Strongly Disagree

The data in Table 4.7 support the research stating teachers must have some control over their PL experiences. “Teachers must be understood as professionals and individuals with particular strengths and passions and must be able to develop personal goals that dovetail with school goals and desired student outcomes” (Gleason & Gerzon, 2013, p. 33). These data support the 2012 Metlife Survey of the American Teacher where over 60%

of teachers stated they learn better when they are given a choice in their learning and it is done in collaboration with other educators (Metlife, 2013). The drop in the score for learning researched-based practices throughout their career may be based on the fact that they learned through SLL and were not given the research behind the effectiveness of the practice. Campus and district administrators must understand that, "a high degree of teacher buy-in is essential for successful implementation of effective professional development" (Mosley, 2015, p. 10). However, it is recommended that RHS also present more of the research behind their initiatives so that the teachers understand the data behind the practices in which they are engaging.

In summary, to answer Research Question 1, data were compiled by rank ordering the scores for the 20 questions appearing on both the pre- and post-survey. The responses were organized by quintile scores ranking highest to lowest and are represented in Table 4.8. The data clearly show, by a consistent mean of 2.2, that teachers do not prefer administration designed and led in-service training. This confirms research and findings as far back as Joyce and Showers' 1980 study that stated PD must be removed from isolated events and transferred to the classrooms where teachers experience training activities that "combine theory, modeling, practice, feedback, and coaching to application" (Joyce & Showers, 1982, p. 384). In addition, teachers scored in-service training days in the bottom 4, with a pre-survey score of 2.5, as well as a guest speaker, which is also a type of district led training. Conversely, teachers scored collaboration and immediately adaptable learning as a 4.4, which has not historically been a strong type of training offered by RISD. Learning from other teachers and having voice and choice in their learning was scored the

highest with a 4.5 on both indicators on the pre-survey. These data clearly show SLL is preferred to other PL opportunities provided by the campus and district.

Table 4.8

Highest and Lowest Quintile on the Pre- and Post-Survey

		Pre-/Post-Survey Questions	**Pre-Mean**	**Pre-*SD***	**Post-Mean**	**Post-*SD***	**Δ**
Lowest Quintile	S8	I believe the school and administration should decide and plan all professional learning opportunities for the staff.	2.2	0.94	2.2	0.71	0
	S18	Teachers must continue to learn researched based best practices throughout their career.	2.3	0.93	1.9	0.67	-0.43
	S14	The best profession leaning experiences occur as isolated events such as teacher in-service days.	2.5	0.84	2.6	0.86	0.1
	S13	Listening to a guest speaker or expert will improve my teaching practice.	3.1	0.74	3.4	0.57	0.3
	S15	I believe that teacher collaboration is a powerful tool for professional learning.	4.4	0.98	4.7	0.48	0.24
Highest Quintile	S16	I prefer professional learning activities that can be immediately adapted to my classroom.	4.4	0.98	4.5	0.51	0.04
	S2	When learning, I prefer to have a choice in the topic.	4.5	1.09	4.6	0.57	0.1
	S19	I believe that I can learn from other teachers at RHS.	4.5	0.98	4.6	0.5	0.12

"Other researchers recommend considering knowledge and experience differences among teachers in designing PD and personalizing PD to address teachers' particular circumstances and challenges" (Minor et al., 2016, p. 21). However, the analysis of RISD PL trainings in Chapter II, Table 2.2, clearly show that a majority of the PL experienced by teacher at RHS and RISD has been just that. To further analyze teacher views on traditional, collaborative, and JEPL learning, Table 4.9 presents the mean for each question by years' experience in education. The data for question PO5 show teachers with less than 16 years' experience feel more strongly, scoring a mean of 4 and above, than those with more experience, scouring the question with a mean of 3.8 and below, that peer observation will improve their teaching practice. Question PO10 indicates teachers with more than 16 years' experience do not feel as strongly as others that learning from an instructional coach will improve them as a teacher showing a mean score of 3.4 and 3 as opposed to the 4+ mean posted by the less experienced teachers. Teachers with 5 or less years of experience are more neutral about the administration deciding their PL with scores of 3 and 4 in PO12, whereas teachers with more than 5 years' experience all reported a mean of 4.4 or higher indicating they prefer voice in choice in their learning.

According to short answer question 22 in the post-observation survey, Figure 4.1, 100% of the teachers who responded felt the SLL program was a more positive experience than other PL offered by the district or campus. The responses included statements such as "I think SLL is very valuable." "You are able to see students in different classrooms and see how other teachers teach." "It also does not take a long period of time and you're able to learn a lot in the short time you spend in another classroom."

Table 4.9

Post-Observation Mean Score by Number of Years in Education

	Post-Survey Questions	0-1 years *n* = 2	2-5 years *n* = 4	6-15 years *n* = 13	16-25 years *n* = 5	25+ years *n* = 1
PO1	Conferences and workshops will improve my teaching practices (on subject matter, methods, or other instructional topics).	4.5	4	3.9	4.4	5
PO2	When learning, I prefer to have a choice in the topic.	4	4.3	4.8	4.8	5
PO3	Participation in a teacher study group will improve my teaching practice (book study/lesson study).	4.5	3.5	3.9	3.8	4
PO4	I find value in receiving feedback from my peers.	4.5	4.5	4.6	4.4	4
PO5	I believe that peer observation will improve my teaching practice.	4	4.8	4.4	3.8	3
PO6	I believe participation in a teacher network structured around professional learning will improve my teaching practice.	4	4.3	4.2	4.4	4
PO7	I learn best when professional learning occurs during instruction in the regular school day.	3.5	3.5	3.6	3.2	4
PO8	I believe the school and administration should decide and plan all professional learning opportunities for the staff.	2.5	2.3	2.3	1.8	2
PO9	I believe mentoring another teacher will improve my teaching practice.	3.5	4	3.8	4.2	2
PO10	I believe that the RISD coaching model will improve my teaching practice.	4	4.3	3.8	3.4	3
PO11	I believe that other STEM teachers can improve by observing my classroom.	3.5	3.3	4.1	3.2	4
PO12	When learning, I prefer to have a choice in the method of delivery of the information.	3	4	4.4	4.6	5
PO13	Listening to a guest speaker or expert will improve my teaching practice.	3	3.5	3.2	3.6	4
PO14	The best profession leaning experiences occur as isolated events such as teacher in-service days.	3	2.5	2.8	2.2	2
PO15	I believe that teacher collaboration is a powerful tool for professional learning.	4.5	4.5	4.8	4.8	4
PO16	I prefer professional learning activities that can be immediately adapted to my classroom.	4	4.5	4.5	4.6	4
PO17	I believe teachers have the ability to drive their own professional learning.	3.5	4.3	4.6	4.8	5
PO18	Teachers must continue to learn researched based best practices throughout their career.	2	1.5	2	1.8	2
PO19	I believe that I can learn from other teachers at RHS.	5	4.5	4.5	4.8	4
PO20	I believe that the longer I am a teacher, the less professional learning I need.	4	3.8	4.2	4.6	4

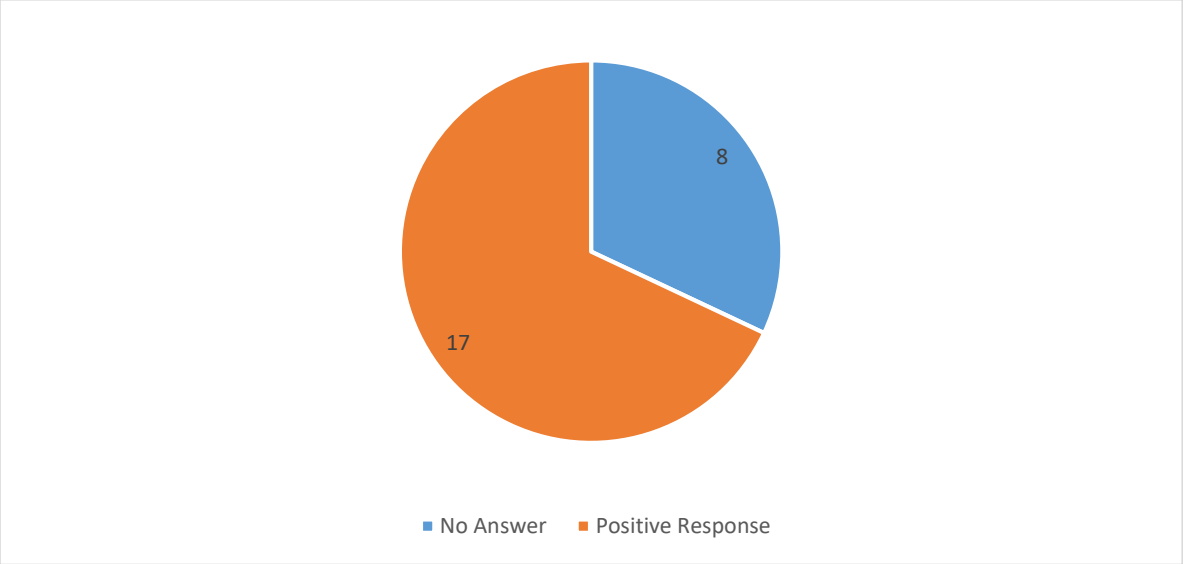

Figure 4.1. How SLL Compares to Other PL Opportunities Provided by the Campus or District.

Choice was also a common theme in their statements, “I much prefer the freedom to choose what I observe. This allows me to experiment by observing teachers outside of my content area, which can often give ideas I feel I never would have come up with while staying inside my own ‘bubble.’ There is choice involved in who I can go observe and when observing, you never know what you may see, learn; It's a pretty amazing situation to be in.”

Another common theme found in their statements indicated the desire for PL activities to relate directly to the classroom and occur in real time. Those statements included, “SLL is more directly related to what we do on a daily basis and we see what is going on in our school.” “It occurs in real time.” “I like that it is real time instruction, not a prepared demonstration.” Therefore, with the data presented, it is clear that teachers prefer

the type of learning offered by the SLL program and rates it higher than previous experiences offered by both the campus and the district.

Findings for Research Question 2

The purpose of the second set of 20 questions in the post-observation survey was to ascertain if the STEM teachers believe that SLL should continue as an option for personalized learning at RHS, Research Question 2. The survey questions were designed to inquire about Guskey's evaluation levels 1 through 4:

Level 1 – Gathers information about the participants' reactions to the PL experience

Level 2 – Collects data about their individual learning and growth during the experience

Level 3 – Inquires if teachers have the resources and support needed to implement their new learning successfully

Level 4 – Evaluates how teachers are using their new knowledge and skills in their classroom instruction or lesson design

The researcher created five questions that align to each of the four levels of the adapted Guskey evaluation model. The survey questions were created by the researcher, in order to collect data for a valid evaluation study, based on the campus SLL program and the descriptions of each of Guskey's levels (Guskey, 2002a). Guskey believed "good evaluations don't have to be complicated. They simply require thoughtful planning, the ability to ask good questions, and a basic understanding of how to find valid answers" (Guskey, 2002a, p. 46). As described in Chapter 3, level 1 questions were structured to measure how the participants like the learning with questions such as, "I will continue to

participate" and "I like that it occurs in real time with students." Level 2 is about individual learning, so the researchers designed questions to measure that learning. For example, two of the questions were, "SLL program has helped me improve my teaching ability" and "I learned more about student engagement." Level 3 evaluates if teachers have the support and resources needed to implement the new learning. To address this, the author created questions like, "Improvements can be made in the SLL program" which, depending on the results, could prompt the principal to inquire as to the supports needed for programmatic success. The last level measured in this study, level 4, evaluates how the teachers are using the new learning with their students. Questions such as, "I have been able to apply learning from my SLL observation immediately in my classroom" and "I changed how I structure my classroom as a direct result of SLL" allow the researcher to garner the appropriate data for analysis.

The Guskey model was chosen as the preferred evaluation tool for this study because it was based on an understanding that tying PL to measure one outcome, such as student success or teacher satisfaction, cannot be the only tool used in an evaluation (King, 2014). Guskey's four-level adapted model, evaluates four different aspects of the SLL program (King, 2014). Guskey's model also supports real life implications in the high school setting because he designed it understanding "the complexity of teacher learning and teacher change to know how to support the link between teacher engagement and pupil outcomes" (King, 2014, p. 90). Although this study is not researching the effects of the PL on student outcomes at this time, level 5, increased student achievement is the goal of all professional learning activities implemented at RHS. Guskey understood that it would take

time and planning to facilitate the participants' progress, so tracking the effectiveness of the program at each level is important.

Table 4.10 is a compilation of data from the survey questions relating to the four levels of Guskey's evaluation model described above. These questions appeared only in the post-survey after the teachers participated in the SLL peer observations. Tables 4.11 through 4.14 show the survey results broken down by each individual level to allow a level-by-level analysis of the program as recommended by Guskey.

Table 4.10 presents the mean and standard deviations for the post-survey questions relating to the SLL evaluation questions. The question that scored the lowest mean, EQ 17, of 3.0 related to structural changes in the classroom as a result of SLL; however, it was one of the highest SDs at .81, showing a wide variance in responses. That being said, the SLL lowest score remained in the "neutral" scores on the Likert scale indicating most teachers felt either neutral or positive about the SLL experience. Two questions resulting in the strongest mean indicator of 4.2, EQ 9 and EQ 13, indicated teachers felt strongly about the importance of reflection in the SLL program as well as their ability to learn from teachers outside of the STEM department. With *SD* for those questions at .69 and .58 respectively, it shows a more consistent response from the teachers and less variance in thoughts and ideas about SLL. The question that showed the most variance in response, with an *SD* of .87, was EQ19 asking about changes in assessment of students as a result of SLL.

Table 4.10

SLL Evaluation Questions

	Post-Survey Evaluation Questions	Mean	Median	Mode	*SD*
EQ1	I believe the SLL program has helped me improve my teaching ability.	3.8	4	4	0.69
EQ2	I believe the SLL program is an effective way for all STEM teachers to improve instruction.	3.8	4	4	0.47
EQ3	I believe the SLL program should be continued at RHS.	3.8	4	4	0.58
EQ4	Improvements can be made in the SLL program at RHS.	3.6	4	4	0.71
EQ5	SLL is a more effective vehicle for job-embedded professional learning than other activities provided by the RISD.	3.5	4	4	0.71
EQ6	I believe SLL is an effective program for all teachers at RHS.	3.9	4	4	0.67
EQ7	I would recommend participation in the SLL program to my peers.	4.0	4	4	0.73
EQ8	I will continue to participate in the SLL program at RHS.	3.9	4	4	0.70
EQ9	I believe I can learn from other teachers, through the SLL program, outside of the STEM department.	4.2	4	4	0.69
EQ10	The SLL programs allows me to control my professional learning.	3.8	4	4	0.65
EQ11	I like that the SLL program occurs in real time, in a classroom with students.	4.1	4	4	0.44
EQ12	I have been able to apply learning from my SLL observations immediately in my classroom activities and lesson plans.	3.8	4	4	0.85
EQ13	Reflection is an important part of the SLL program.	4.2	4	4	0.58
EQ14	The SLL program has changed how I question students in my classroom.	3.3	3	3	0.84
EQ15	I shared information I learned as a result of my SLL activities with my peers.	3.4	4	4	0.82
EQ16	I learned more about student engagement through my SLL activities.	3.8	4	4	0.75
EQ17	I changed how I structure my classroom as a direct result of SLL activities.	3.0	3	3	0.81
EQ18	My time was well spent engaging in SLL observations.	4.0	4	4	0.79
EQ19	I focus more attention to how I assess students as a result of my SLL observations.	3.5	4	4	0.87
EQ20	The SLL observations helped me acquire the intended knowledge and skills I anticipated from the PL.	3.8	4	4	0.78
	TOTAL	3.8			

Note. Rankings: 5 – Strongly Agree, 4 – Agree, 3 – Neutral, 2 – Disagree, 1 – Strongly Disagree

Using Guskey's first four levels of evaluation to analyze the results of the study and answer Research Question 2, Table 4.11 categorizes these questions for level 1 of the Guskey Framework with participants' reactions to the overall PL experience. The results in Table 4.11 show the teachers overwhelmingly prefer PL that occurs in real time with students. This indicator garnered the highest score in the category and the lowest *SD* of all questions. The *SD* of .44 indicates this question had the least amount of variance in responses compared to all other questions in the survey. Here again, the data are supporting the literature that stated "teacher learning may be most relevant when it focuses on teachers' real work in school with young people and addresses the unique context of their schools" (Patton, Parker, & Tannehill, 2015, p. 29). Question EQ2 also had a low variance among teacher's perceptions with an *SD* of .47 when they stated they believe the SLL program is an effective way for STEM teacher to improve instruction. Looking at these data in comparison to Guskey's evaluation model, with the mean ranging from 3.8 to 4.1, it can be concluded that the participants' reactions to the PL experience were positive.

Table 4.12 illustrates the data for level 2 of the Guskey evaluation model that collects information from the participants about their learning. The two highest scoring categories in this level were questions EQ9 and EQ18 with a mean of 4.2 and 4.0, respectively. These questions stated that teachers believe their time was well spent in learning from other STEM teachers and that they felt they could also learn from teachers outside of the STEM field. There is an immense amount of literature supporting the "social nature of learning though the creation of a structured and human supportive environment [which] permits intentional collective learning and the application of that learning" (Patton, Parker, & Tannehill, 2015, p. 30).

Table 4.11

Post-Observation Survey Data Aligned to Guskey's Level 1 Framework

	Post-Survey Evaluation Questions	Mean	Median	Mode	*SD*	Guskey Level
EQ2	I believe the SLL program is an effective way for all STEM teachers to improve instruction.	3.8	4	4	0.47	1
EQ6	I believe SLL is an effective program for all teachers at RHS.	3.9	4	4	0.67	1
EQ8	I will continue to participate in the SLL program at RHS.	3.9	4	4	0.70	1
EQ10	The SLL programs allow me to control my professional learning.	3.8	4	4	0.65	1
EQ11	I like that the SLL program occurs in real time, in a classroom with students.	4.1	4	4	0.44	1

Table 4.12

Post-Observation Survey Data Aligned to Guskey's Level 2 Framework

	Post-Survey Evaluation Questions	Mean	Median	Mode	*SD*	Guskey Level
EQ1	I believe the SLL program has helped me improve my teaching ability.	3.8	4	4	0.69	2
EQ9	I believe I can learn from other teachers, through the SLL program, outside of the STEM department.	4.2	4	4	0.69	2
EQ16	I learned more about student engagement through my SLL activities.	3.8	4	4	0.75	2
EQ18	My time was well spent engaging in SLL observations.	4.0	4	4	0.79	2
EQ20	The SLL observations helped me acquire the intended knowledge and skills I anticipated from the PL.	3.8	4	4	0.78	2

The participants also agreed that SLL improved their teaching and helped them learn about student engagement, scoring a mean of 3.8 on both questions. The *SD* deviations for questions in level 2 ranged from .69 to .79, which shows more variance in the teachers' responses than those in level 1; however, with the mean ranging from 3.8 to 4.2, the data show the teachers' evaluation of Guskey's level 2 is positive. The knowledge and skills the teachers obtained through the SLL program were valuable professional learning and will have an impact on their relationship with their peers as well as the instruction taking place in their classrooms.

Table 4.13 illustrates the data for level 3 of the Guskey evaluation model concerning organizational support and change in terms of the administration of the program, the practices and policies needed for a successful PL experience. The lowest scoring question, EQ15, with a mean of 3.4 also had a large variance in responses with a *SD* of .82. The data are showing teachers need an outlet to share information and self-reflection. In the pre- and post-survey, teachers expressed the importance of reflection for the SLL program; however, here in level 3 analysis, the administration is not providing enough structure or support for the reflection and sharing of information. These data support the idea that although "traditional one-shot professional development may supply some potentially valuable information, it is unlikely to help teachers become learners and thinkers in the design and delivery of instruction" (Patton et al., 2015, p. 31). Questions EQ3 and EQ7 illustrate teachers believe the program should continue at RHS and that they would recommend it to others with a mean of 3.8 and 4.0, respectively. However, EQ4 indicates there is improvement needed in the program with a score of 3.6. In looking at the overall evaluation for level 3, the data show the program in a positive light; yet, there is

still a need for organizational change to strengthen the process and allow teachers time for collaboration and reflection.

Table 4.13

Post-Observation Survey Data Aligned to Guskey's Level 3 Framework

	Post-Survey Evaluation Questions	Mean	Median	Mode	*SD*	Guskey Level
EQ3	I believe the SLL program should be continued at RHS.	3.8	4	4	0.58	3
EQ4	Improvements can be made in the SLL program at RHS.	3.6	4	4	0.71	3
EQ5	SLL is a more effective vehicle for job-embedded professional learning than other activities provided by the RISD.	3.5	4	4	0.71	3
EQ7	I would recommend participation in the SLL program to my peers.	4.0	4	4	0.73	3
EQ15	I shared information I learned as a result of my SLL activities with my peers.	3.4	4	4	0.82	3

Table 4.14 illustrates the data for level 4 of the Guskey evaluation model indicating teachers were able to change their instruction and apply their learning as a result of participation in the SLL program. In terms of applying the learning immediately, teachers strongly agreed that they reflected on their observations as indicated in EQ13 with the highest mean of 4.2 and a low variance in responses with an *SD* of .58. Teachers also felt they were able to apply learning from SLL immediately with a mean of 3.8; even so, when they were asked specific questions as to how it was applied, the mean lowered. Changes regarding questions of students scored a mean of 3.3 with a large *SD* of .84 while other classroom changes involving how the class was structured measured with the lowest mean of the SLL survey at 3.0 again with large variance of responses at .81. Overall, the

evaluation of SLL using level 4 of the Guskey evaluation model also shows a positive experience from the teacher feedback. However, the importance of applying PL must be noted. “Professional development that is intensive and includes application of knowledge to teachers’ planning and instruction is most likely to influence teachers’ practice and, in turn, positively affect student achievement” (Patton et al., 2015, p. 35).

Table 4.14

Post-Observation Survey Data Aligned to Guskey’s Level 4 Framework

	Post-Survey Evaluation Questions	**Mean**	**Median**	**Mode**	***SD***	**Guskey Level**
EQ12	I have been able to apply learning from my SLL observations immediately in my classroom activities and lesson plans.	3.8	4	4	0.85	4
EQ13	Reflection is an important part of the SLL program.	4.2	4	4	0.58	4
EQ14	The SLL program has changed how I question students in my classroom.	3.3	3	3	0.84	4
EQ17	I changed how I structure my classroom as a direct result of SLL activities.	3.0	3	3	0.81	4
EQ19	I focus more attention to how I assess students as a result of my SLL observations.	3.5	4	4	0.87	4

The data presented in Table 4.15 subdivide the participants’ reactions and evaluation of the SLL peer observation experience by the number of years the teachers have been in education. The data show consistent results in many questions; however, in EQ4, one point of notice is the teacher with 25+ years’ experience disagrees with the rest of the participants by disagreeing that changes need to be made to the SLL program with a mean of 2, while all others’ scores show the mean at 3.3 or above.

Table 4.15

SLL Post-Observation Data by Years of Teaching Experience

	Post-Survey Evaluation Questions	0-1 years *n* = 2	2-5 years *n* = 4	6-15 years *n* = 13	*16-25 years n = 5*	25+ years *n* = 1
EQ1	I believe the SLL program has helped me improve my teaching ability.	4	4	4	3.2	4
EQ2	I believe the SLL program is an effective way for all STEM teachers to improve instruction.	4	3.8	3.9	3.6	4
EQ3	I believe the SLL program should be continued at RHS.	4	3.8	3.9	3.4	4
EQ4	Improvements can be made in the SLL program at RHS.	3.5	3.3	3.7	3.8	2
EQ5	SLL is a more effective vehicle for job-embedded professional learning than other activities provided by the RISD.	3	3.8	3.5	3.4	4
EQ6	I believe SLL is an effective program for all teachers at RHS.	3.5	3.8	3.9	4	4
EQ7	I would recommend participation in the SLL program to my peers.	4	4.3	4.1	3.8	4
EQ8	I will continue to participate in the SLL program at RHS.	4	4.3	4	3.4	4
EQ9	I believe I can learn from other teachers, through the SLL program, outside of the STEM department.	4	4.8	4	4.2	4
EQ10	The SLL programs allows me to control my professional learning.	4	4	3.6	4	4
EQ11	I like that the SLL program occurs in real time, in a classroom with students.	4	4.3	4.1	4.2	4
EQ12	I have been able to apply learning from my SLL observations immediately in my classroom activities and lesson plans.	4	4	3.9	3.4	4
EQ13	Reflection is an important part of the SLL program.	4	4.3	4.2	4.2	4
EQ14	The SLL program has changed how I question students in my classroom.	3	3.8	3.3	3	3
EQ15	I shared information I learned as a result of my SLL activities with my peers.	2.5	3.8	3.6	3.4	2
EQ16	I learned more about student engagement through my SLL activities.	3.5	4	3.7	4.2	4
EQ17	I changed how I structure my classroom as a direct result of SLL activities.	2.5	3.3	3.2	2.8	2
EQ18	My time was well spent engaging in SLL observations.	4	4.5	4	3.8	4
EQ19	I focus more attention to how I assess students as a result of my SLL observations.	4	3.8	3.5	3.4	2
EQ20	The SLL observations helped me acquire the intended knowledge and skills I anticipated from the PL.	4	4.3	3.7	3.6	3

Another notable outlier in the data is EQ15, which inquired about teachers sharing information learned from their SLL observations. Both the first-year teachers and the most experienced teachers recorded a mean of 2.5 and 2, respectively. Teachers with 2 to 25 years of experience all scored a mean of 3.4 or higher indicating they shared information. Overall, the participants, regardless of years' experience, shared more of the same views concerning the SLL evaluation than they showed in their perception of PL. The analysis of the participants' reactions to the peer observation experience, when broken down by years of teaching experience, supports a positive evaluation of the overall SLL program as a job-embedded professional learning experience.

It is important to note a few of the nuanced findings when analyzing the data based on years of experience. Louws, van Veen, Meirink, and van Driel (2017) described a teacher's career in three phases: (a) induction, (b) mid-career, and (c) late career. Table 4.16 pulls out a few questions and elements of data for comparison and discussion in relation to these phases. For instance, PO1 and PO3 are questions dealing with traditional types of professional development. The two groups that most strongly agreed with these statements are the 0-1 and 25+ years of experience, or the induction and late-career phases. This outcome is not surprising in that first-year teachers do not often know what kind of professional development they need to engage in to grow because they are new to the profession. Those teachers with more experience are more comfortable with traditional methods and do not embrace new types of PL as easily as "motivation for learning decreases as teachers become more experienced (Louws et al., 2017, p. 489).

Questions PO5, PO9, and PO10 are types of JEPL that have become more popular in the 21st century. The data clearly show that they are more favored by the three

experienced groups in the middle of the study or mid-career teachers, those with 2-25 years of experience. Mid-career teachers typically find themselves more committed to teaching and are actively trying to improve their effectiveness in the classroom (Louws et al., 2017).

The last two questions in Table 4.16, PO12 and PO17, both address teacher choice in the design of their PL. As the number of years of experience increases through the five groups used in this study, so is the degree to which the participants agree with the statement. Current research states that in order to design or structure appropriate professional learning for teachers, there must be regular inquiry into a teacher's individual professional learning goals and allowing for teachers to be self-directed in their pursuits (Louws et al., 2017). This enables the teachers to have more choice in their goalsetting and learning as they gain experience in the profession.

Table 4.16

SLL Post-Observation Data by Years of Teaching Experience Highlights

	Post-Survey Questions	**0-1 years *n* = 2**	**2-5 years *n* = 4**	**6-15 years *n* = 13**	**16-25 years *n* = 5**	**25+ years *n* = 1**
PO1	Conferences and workshops will improve my teaching practices (on subject matter, methods, or other instructional topics).	4.5	4	3.9	4.4	5
PO3	Participation in a teacher study group will improve my teaching practice (book study/lesson study).	4.5	3.5	3.9	3.8	4
PO5	I believe that peer observation will improve my teaching practice.	4	4.8	4.4	3.8	3
PO9	I believe mentoring another teacher will improve my teaching practice.	3.5	4	3.8	4.2	2
PO10	I believe that the RISD coaching model will improve my teaching practice.	4	4.3	3.8	3.4	3
PO12	When learning, I prefer to have a choice in the method of delivery of the information.	3	4	4.4	4.6	5
PO17	I believe teachers have the ability to drive their own professional learning.	3.5	4.3	4.6	4.8	5

According to short answer question 23 in the post-observation survey, Figure 4.2, provides feedback on how the teachers felt the SLL initiative met their needs as a PL program for STEM teachers at RHS. The statements were coded into the categories listed in Figure 4.2 and tallied for quantitative comparison and analysis. Fifteen of the 18 respondents to this question felt that the SLL program met their personalized learning needs as opposed to other PL opportunities provided by the district. The response statements pointing out new instructional ideas and practices include, "The SLL (program) meets my needs by allowing a view of how other teachers implement different forms of teaching and how this can benefit me as a teacher." "By observing others, I have the opportunity to improve my own classroom. I never know what I might learn when visiting a room, and I think that is what is most powerful. You may see something you never knew existed, or you may see something that you never you knew you needed until you see it." "We are always hearing about the great things teachers are doing in the classroom and I enjoyed being able to go see what those teachers are doing. I was able to get ideas and will be able to adapt and use them in my classroom." Time management was also a theme common in the teachers' responses such as, "It allows me to use my time most effectively and be able to learn more in 1 hour than any 7-hour campus/district training provides." "I feel the SLL program addressed my needs completely. The program allowed me to observe other teachers I wouldn't normally have a chance to see, and also get feedback from my peers who observed me." The findings in this study support Desimone's (2011) research findings that observing peers provides influential PL for teachers. The importance of observing and assimilating new ideas was also discussed in Louis and Lee's (2016) study and confirmed by the SLL study data results as well.

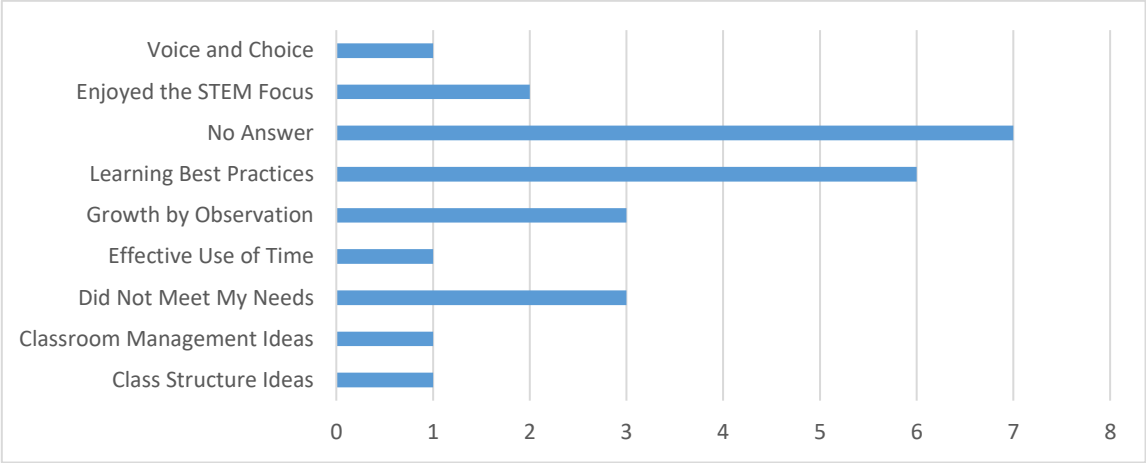

Figure 4.2. How SLL Meets the Needs of the Teachers.

Findings for Research Question 3

Research Question 3 addresses how RHS STEM teachers would improve or change the SLL program. Again, the short answer responses were coded in seven categories for analysis and reporting purposes as seen in Figure 4.3. Twenty-two, or 25, survey respondents answered this question. Of the respondents, 8 felt no changes were needed to the program. The change most requested in the study, 5 of 25, or 20%, would be a communications vehicle that would allow the teachers to know the lessons ahead of time so they knowledgably choose the class to visit. Providing some sort of feedback structure was also important to the participants, as evidenced by their responses. Reflection and feedback is an important part of PL and the teachers value that as part of their continuing education. Bleicher's (2014) research suggested that reflection "is the lynchpin to sustainable change in practice. Reflection can be conceived as the fuel for motivation and participation in cycle of change" (p. 804). Other suggestions would be to visit classes in groups, allowing for collaboration, a more extended time for the visits, and the period during the school year the visits occur. These data confirm prior research by Marzano et al.

(2010), whose study suggested teachers need and want feedback that is done on a regular basis as well as within and across teaching genre's. It also agrees with a concern relating to peer observation in that appropriate time must be given for both the observation and feedback elements of the program in order for teacher learning to be effective (Hamilton, 2012).

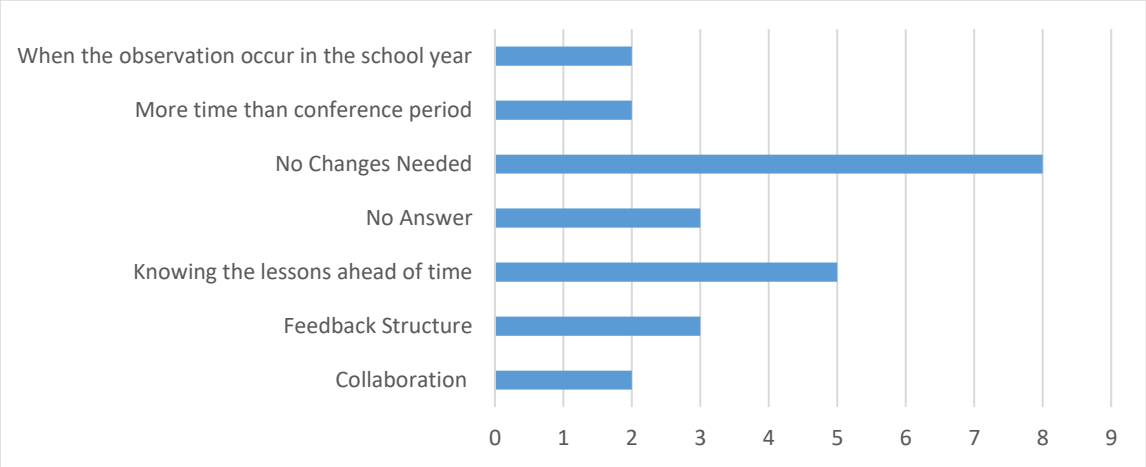

Figure 4.3. Responses to Short Answer Question 1.

Summary of Research Findings

The pre- and post-survey data used in this case study not only allowed the researcher to evaluate the effectiveness of the SLL program at RHS, but also how to improve the program for the future. The analysis of the data resulted in nine significant findings. It is evident by the data presented that teachers do not want school or district administrators designing their PL, they value voice and choice in their learning. Furthermore, teachers also place significant importance on the ability to collaborate with other educators when learning. This extends to the ability to learn from each other in real time, in classrooms, and with students present. This learning is not isolated to teachers in

their subject matter, but rather extends to all educators, regardless of grade level or teaching genre.

As a summative response to these findings, the data indicated that the STEM teachers believe learning from other teachers through peer observation is a valuable practice and should be continued at RHS. In order for this learning to occur, campus administrators must put some systems in place to aid teachers in their growth and development. The administration must structure their master schedule or school day to provide teachers time for feedback and reflection, as it is highly valued by the teachers. In addition, administration needs to provide a structure for peer feedback and reflection as well as a mechanism that would allow teachers to share the details of the lesson available for observation, allowing the observers to have more choice in their learning and what they are going to observe. Finally, administration needs to provide a structure for groups of teachers to observe their peers together in order to facilitate more teacher collaboration.

CHAPTER V

DISCUSSION, IMPLICATIONS, RECOMMENDATIONS, AND CONCLUSIONS

Research Overview

This chapter provides a synopsis of the study, the methods used to investigate the overarching question, and the research questions. It describes the researcher's findings and draws conclusions extrapolated from the data analysis. Due to the practitioner nature of this record of study, this section also describes implications for current and future educators as well as make recommendations for further research.

Using an evaluation model based on quantitative procedures, this study sought to answer the following overarching question: How does STOP (Successful Teacher Observation Protocol) Light Learning (SLL) meet the professional learning (PL) needs of science, technology, engineering, and math (STEM) teachers as an innovative, job-embedded, peer observation program in a southwestern high school? The SLL program is a pioneering peer observation program created by the researcher and implemented at Redwood High School (RHS) three years ago. This study provides formal evaluation, which has been lacking, to assess the effectiveness of this program as a job-embedded professional learning (JEPL) initiative. Quantitative data were collected using a pre- and post-survey of STEM teachers engaged in peer observations. The study spanned a period of four weeks in March and April of 2017 and involved a group of 30 teachers. The data analysis used the descriptive statistics of mean scores and standard deviations to describe the experiences of the participants and the variance in their ratings on a Likert scale. The surveys consisted of participant demographic information, 20 questions regarding teacher

perception on various delivery methods for PL, 20 questions on the evaluation of the SLL program, and three open-ended questions directly relating to the research questions that were coded for quantitative analysis.

Discussion of the Findings

The purpose of the record of study was to (a) ascertain how the STEM teachers at RHS rate the SLL learning experience compared to other PL experiences, (b) determine if teachers believe SLL should continue as an option for personalized learning, and (c) establish recommendations for improvements or changes to the observation program. Table 5.1 establishes how the data support the findings as it relates to each research question. These data were gathered from the 20 questions appearing on both the pre- and post-surveys and summarized in Table 5.1. The findings of this study indicate that SLL does meet the PL needs of STEM teachers as a job-embedded peer observation program as demonstrated by the data reviewed in Chapter IV. However, as evidenced by the data gathered to answer Research Question 3, there are improvements that can be made to the structure of the SLL program to make it more effective for teacher learning. Not all teachers in the study were comfortable with the nature of this innovative PL program and felt they could still learn and develop as teachers from traditional forms of PD as well as peer observation. Structures for teacher reflection were consistently noted as important and missing from the SLL program. One teacher shared the following:

> I think we are moving in the right direction; however, this is a way for me to see what works in other classes, but it may not address the exact need that I have. It may help me in other places that I didn't know that I needed. I also need help finding where I am lacking. Reflection is good, but I need feedback to help me reflect.

The conclusions drawn from this study are that there is value in the SLL program and it should be continued at RHS, but with some changes based on the recommendations produced in this study.

Table 5.1

Key Findings as They Relate to the Research Questions from the Pre- and Post-Survey Results

Research Question	Findings
How do STEM teachers at RHS rate the quality of their SLL experiences as compared to other professional learning experiences provided by the campus and the district?	Teachers do not want school or district administrators designing their PL, they value voice and choice in their learning. Teachers want and value the ability to collaborate with other educators when learning.
Do the STEM teachers at RHS believe that SLL should continue as an option for personalized learning?	Learning from other teachers through peer observation is a valuable practice and should be continued at RHS. Teachers find value in observing and learning from others both within and outside of their teaching genre. Teachers found value from learning in real time, in classrooms, with students present.
How would the STEM teachers at RHS improve or change the SLL program at RHS?	Administration needs to provide teachers time for feedback and reflection as it is highly valued by the teachers. Administration needs to provide a structure for peer feedback. Administration needs to provide a mechanism that would allow teachers to share the details of the lesson available for observation, so the observers can have more choice in their learning and know what they are going to see. Administration needs to provide structure for groups of teachers to observe their peers together in order to facilitate more teacher collaboration.

Implications

Peer observation and the SLL program can be an innovative tool to further teacher learning and development. As a result of this case study, the review of the literature, and the analysis of the data, the researcher concluded that there are both practical and theoretical implications associated with this study.

Practical Implications

The following practical implications are vital to campuses that wish to embark on a PL program similar to SLL:

1. Teachers must be included in the planning process for PL and given voice and choice in the content and how they engage in it.
2. Administration must establish a culture of collaboration, reflection, and feedback among their staff for PL purposes.
3. Peer observation is simply one form of PL; campuses and districts must offer a variety of JEPL and traditional professional development (PD) that meets each teacher's individual learning needs.

Teachers must be included in the planning process for PL and given voice and choice in the content and how they engage in it. When looking at adult learning, it is important for teachers to have the efficacy to reflect on their strengths and weaknesses, develop personal goals to improve, and choose how they will obtain the necessary skills and knowledge to achieve those goals (Gleason & Gerzon, 2013). Administrators must use researched-based practices that include teachers in either planning PL experiences or allowing personalized professional learning as a vehicle for instructional improvement. Timperley (2011) believed that the PL activity is not integral to improvement as long as the teacher has choice in the content and that administrative supports are present so the

knowledge and skills that are obtained can be integrated into the classroom. The traditional one size fits all PD models of the past is no longer sufficient and will not allow for the sustained, continuous learning all teachers need in order for students to achieve in the 21st century (Minor et al., 2016).

Administration must establish a culture of collaboration, reflection, and feedback among their staff for PL purposes. According to Schmoker (2004), the school administration must design campus structures to support individual teacher reflection as well as collaboration among peers to support sustained and substantive school improvement. The vision of teachers learning from each other, in real time, must be extended past simple peer observation protocols and move into shared observations that can then be reflected upon and within a PLC to inform current and future instruction. The idea of building teacher communities who continually engage in interactive opportunities to improve instruction and expand their knowledge of pedagogy is an essential outcome of the SLL program. Teachers need and want real time feedback from their peers as well as emotional and instructional support (Stearns et al., 2012). Therefore, it is vital for the administration of a campus who engages in peer observation to take the findings of this study and create the structures needed for successful and impactful PL.

Peer observation is simply one form of PL; campuses and districts must offer a variety of JEPL and traditional PD that meets each teacher's individual learning needs. As evidenced by the results of this study, many teachers still find value in traditional forms of PD such as expert guest speakers or broadly planned learning experiences. Administrators in the schools of today, must provide a wide variety of PL in order for their teachers to access and acquire the information they need to further themselves in the practice of

teaching. Traditional PD combined with JEPL experiences that are collaborative, teacher driven, and ongoing, coupled with supports such as modeling, coaching, and collective problem-solving, allow all teachers to interact with and engage in the type of learning that suits their style and needs (Darling-Hammond & McLaughlin, 1995). What is important for practitioners to note when designing PL is that several studies have shown that when the learning is connected to the teachers' content and curriculum, higher levels of student success can be obtained (Darling-Hammond & McCloskey, 2008).

Theoretical Implications

When looking at theoretical implications of the study, it is important to note how this study fits into the work of previous scholars. An unexpected area of influence emerged when analyzing the results of the importance of studying the professional life of a teachers as it pertains to years of experience. This study could build on the work by Huberman (1995) and Day (2012) to identify similarities and differences within each phase of a teacher's career to provide insights into the positives and negatives in the many variations of professional learning. The SLL study also builds on the research by Fullen (2007) and Camburn (2010) around JEPL. Their work in observation, feedback, collaboration, and reflection all have ties into the SLL study. Fullen believed that traditional professional development has run its course and, through his research, has identified key ideas under which teachers should work. SLL supports his ideas, which state:

1 Traditional PD is not meeting the needs of teachers in their pursuit of learning.

2 Teacher learning should occur in the setting in which they teach (JEPL).

3. The success of the student is dependent on the continuous learning of the teacher.

4. Teachers must work together and observe each other in order to continuously improve.

Camburn's (2010) study revealed that JEPL allowed teachers to collaborate, observe each other, and to focus on an area of PL over an extended period of time. SLL also allows teachers to use peer observation in this way, whereas traditional PD could not have provided the teachers with these in class experiences to enhance their learning.

This study could be replicated or expanded to build on their work and their findings to add to the vast body of literature that exists in this emerging area. In looking at the federal landscape and the past initiatives such as NCLB and Race to the Top, which matriculated into the current Every Student Succeeds Act of 2015, staffing every classroom with an effective teacher is a high priority (Fuller, Hollingworth, & Pendola, 2017). "This requirement is based on decades of research that consistently finds that, of all factors located within a school, teachers have the strongest influence on student outcomes" (Fuller et al., 2017, p. 728). The SLL study not only aids in the development of effective teachers, but gives principals a feedback mechansim for teachers to provide the administration with tools and ideas for improving PL. SLL gives teachers and administrators the opportunities to develop new instructional practices and enhance their pedagogy (Borko, 2004). This study also supports the work by Darling-Hammond in moving teachers away from PD days that are expert driven and into real-time learning events. The learning is job-embedded, occurs over time, through teacher collaboration, and in a cycle of continuous improvement.

Recommendations

Based on my analysis and evaluation of the data collected during this case study, I recommend that the school continue the practice of the SLL program. However, in order to

create an appropriate structure that meets the needs of all teachers, based on the summary of the findings, the follow recommendation must occur:

1. The time period allowed for SLL observations to occur should be extended.
2. A mechanism should be provided that allows teachers to post the content of their lessons that can be easily accessed so observers have more choice in the classrooms they will visit and prior knowledge of the activities that will take place.
3. An action team of administration and campus teacher leaders should be created in order to address:
    - Providing a structure for teachers to visit classrooms in teams or PLCs in order to reflect and learn in collaboration with one another.
    - Providing structured feedback to the teacher who was observed during the SLL observation visit.
    - Developing a structure for continuing evaluation of the SLL program to provide for continuous improvement of the procedures.

Limitations

The researcher is also the principal of the school in which the SLL study was implemented. As such, there is a concern that teacher responses could have been influenced even though a surrogate was in place. In addition, the survey was created by the researcher and was tested for reliability and validity showing an acceptable Cornbach's alpha score of .60, which is only an "acceptable" internal consistency rating. The sample size of teachers, 30, was relatively small and the research was conducted in a comparatively short timeframe of six weeks. The SLL study itself was limited in that it was specifically designed to evaluate its effectiveness with STEM teachers at RHS and

was not inclusive of the entire school. Therefore, the results of the study are not transferrable to different campuses and may not be indicative of other departments at RHS. However, the study could be reproduced in various settings to ascertain the effectiveness of the program in those areas or expanded campus-wide at RHS in the future. Using only quantitative data also limited the study. More data could have been gained from a mixed-methods or qualitative study in order to measure the effectiveness of the SLL program. As mentioned in Chapter IV, further analysis of the effects of the SLL peer observation program could have been analyzed had the researcher designed the survey to capture the ethnicity of the teachers involved, the classes they taught, and the demographics of the students they served. The case study did not measure the impact on student achievement, but rather teacher participation and learning, which added to the study's limitations. Further investigation would be needed to measure the impact on achievement.

Future Research

This case study was designed to evaluate a new PL and investigate if it could be improved or changed. However, there are many implications of this study that could be explored through future research and are worthy of study to have an immediate impact at RHS. The study could be expanded to include the fifth level of the Guskey evaluation model, which requires a measurement of the impact of the professional learning on student achievement. There is also a need for further research into the specific knowledge and skills the teachers obtained during the observations as well as how that information informed their lesson design while enhancing their use of various instructional strategies. The study could be expanded to include all 150 teachers at RHS in order to ascertain the degree to which the entirety of the faculty supports the continuation of the SLL program as well as changes that should be made in order to enhance the learning potential associated

with the protocol. An evaluation encompassing the entire school would also allow for a modification in the study to capture the ethnicity and course data of the participants. The survey could capture these data, or the surrogate could assign each participant a unique number that would be included in the survey so that deeper analysis into the ethnicity, course(s), and student demographics could be studied.

This record of study (ROS) could have benefitted from a change in the design of the study from a strictly quantitative approach to a mixed-methods design. The observation data collected during the study could have been analyzed and coded to reveal specific instructional strategies or other learning experiences documented by the participants during their observations. This information could have provided the researcher with insights that could be shared with practitioners to show the effectiveness of learning through peer observation and the SLL program. Another aspect that could have been studied is using individual SLL observations such as a control group and comparing the experiences and evaluations with a variable group comprised of educators experiencing the protocol in a collaborative group that was structured to allow time for group learning and reflection.

In looking at the study and how it fits into the global literature, the following theoretical changes could be made to allow for a broader scope of the study:

1. The effect of peer observation on improved teacher instruction and increased student achievement is an area of study that could impact all educational institutions worldwide.
2. STEM schools have been in existence in the United States for quite some time; however, there has been little research on the effectiveness of these schools on minority populations. The SLL STEM study could be expanded to either STEM

schools or schools with high populations of underrepresented groups to measure the impact of peer observation on student achievement, specifically in STEM.

Louis and Lee (2016) studied key elements of schools and their association with teachers' capacity to learn and incorporate new information. They describe organizational learning as incorporating "the idea that learning is associated with continuous improvement [which] typically means frequent and deliberate adjustments of classroom practice in response to new ideas rather than strategic orientations" (Louis & Lee, 2016, p. 536). SLL is a program that would fit well in this study and others like it to measure its effectiveness on a larger scale. SLL also creates learning communities that allow for feedback and reflection. It would also fit into larger studies such as those by Horn and Little (2010) where the "authors investigate how conversational routines, or the practices by which groups structure work-related talk, function in teacher professional communities to forge, sustain, and support learning and improvement" (p. 181). The President's Council of Advisors on Science and Technology (PCAST) stated, "Diversity is essential to producing scientific innovation, and we cannot solve the STEM crisis . . . without improving STEM achievement across gender and ethnic groups" groups (Zhang & Barnett, 2015, p. 638). A possible explanation is that the PL the teachers are engaged in, to enhance STEM instruction for underrepresented groups, does not garner "buy-in from teachers because they were not directly involved in the development" (Bleicher, 2014, p. 805). "The present literature regarding the effects of teacher PD on student achievement outcomes indicates differential effects depending on the quality and specific feature of PD provided" (Capraro et al., 2016, p. 182). SLL or peer observation could be a vehicle for study in

advancing PL of teachers in STEM areas and thereby increasing the achievement and opportunities for underrepresented groups in the STEM fields.

Conclusion

This case study has evaluated the following overarching questions of: How does STOP Light Learning meet the professional learning needs of STEM teachers as an innovative, job-embedded, peer observation program in a southwestern high school? The findings indicated:

- The SLL program should be continued at RHS.
- The structure of the SLL program should be examined for implementation of the recommendations provided in this study, including but not limited to:
  - Finding time and creating a process for giving and providing peer feedback during and after the observation process.
  - Encouraging teachers to observe peers both in and out of their teaching genre.
  - Providing a mechanism for teachers to announce lessons available for observation and their content.
  - Allowing for individual or group peer observations.
- The data supported the many studies cited in this ROS that illustrate teachers' value having voice and choice in their learning.
- The body of literature supporting teacher collaboration and peer observation is corroborated by the data recorded from the RHS STEM teachers in this study.
- Learning in real time, in classrooms, with students present is a more preferred structure for learning than traditional professional development.

The overall findings of this research add to a growing body of evidence that supports the effectiveness of JEPL opportunities in acquiring knowledge and skills in real time, and in classrooms with students present, can be a more effective way of furthering teachers' pedagogical knowledge (Camburn, 2010). It also supports the idea that teachers need continuous, collaborative learning with a community of their peers that can be immediately adapted and utilized in their classroom (Kazempour & Amirshokoohi, 2014). The data and findings resulting from this study can be used by campus and district administrators to aid them in creating teacher action teams to design and implement peer observation or other forms of JEPL opportunities for their teachers. Investing in this type of teacher learning can help schools, districts, and states improve their educational systems in order to achieve the improved student performance demanded, not only by Every Student Succeeds Act (ESSA), but by the parents and students served in our schools and classrooms every day.

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APPENDIX A

2014 STOP LIGHT LEARNING VOLUNTEER SURVEY RESULTS

	Timestamp	What would you say was the Level of Engagement for the majority of students in the classroom that you observed?	What did you go to the classroom to specifically observe?	Did you get out of the observation what you were looking for?	How do you feel about this experience?
1	2/11/2014 7:44:17	Authentic (actively involved, see value in work)	Technology	More than	It was enlightening
2	2/11/2014 7:46:45	Authentic (actively involved, see value in work)	Technology	Yes	It was stimulating.
3	2/11/2014 10:11:54	Authentic (actively involved, see value in work)	I wanted to get ideas about how other teachers in my content area incorporate technology.	Yes	Very worthwhile
4	2/19/2014 8:26:52	Authentic (actively involved, see value in work)	Use of technology and potential glitches	Teacher requested points of observation	I appreciate the opportunities
5	2/19/2014 8:29:14	Authentic (actively involved, see value in work)	Use of technology and potential glitches	Yes	I appreciate the opportunities
6	2/19/2014 10:53:50	Authentic (actively involved, see value in work)	Use of technology in Chem Lab	Yes	Great conversation
7	2/19/2014 14:44:37	Authentic (actively involved, see value in work)	use of tablet devices for biology lesson	Yes	thankful to have the opportunity to observe
8	2/19/2014 14:47:10	Authentic (actively involved, see value in work)	use of tablet technology in chemistry lesson	Yes	Good
9	2/19/2014 16:09:14	Authentic (actively involved, see value in work)	Technology	I got more	Awesome
10	2/20/2014 6:50:09	Authentic (actively involved, see value in work)	Technology use in the lesson	Yes	I enjoyed it! It was great to see how non tech teachers are integrating technology in the classroom.

	Timestamp	What would you say was the Level of Engagement for the majority of students in the classroom that you observed?	What did you go to the classroom to specifically observe?	Did you get out of the observation what you were looking for?	How do you feel about this experience?
11	2/20/2014 7:03:56	Authentic (actively involved, see value in work)	technology application	Yes	good
12	2/20/2014 7:04:44	Authentic (actively involved, see value in work)	technology application	Yes	good
13	2/20/2014 7:30:53	Authentic (actively involved, see value in work)	Reaction	Yes	great
14	2/20/2014 7:34:40	Authentic (actively involved, see value in work)	Strategies for using tablets	Yes	positive
15	2/20/2014 7:53:36	Authentic (actively involved, see value in work)	To see how students and teacher dealt with obstacles they confronted.	Yes	I feel fortunate to have been a part of this.
16	2/20/2014 9:43:42	Authentic (actively involved, see value in work)	use of technology	Yes	excellent learning opportunity
17	2/20/2014 9:47:37	Retreatism (hoping not to be noticed doing nothing)	technology use	used technology at the beginning of class and not again during the lesson, had some very good take aways from lesson	learned how to work through all details thoroughly when planning
18	2/20/2014 10:08:38	Authentic (actively involved, see value in work)	Effective use of technology	Yes	Wow!
19	2/20/2014 10:21:10	Authentic (actively involved, see value in work)		Yes	
20	2/20/2014 10:32:33	Authentic (actively involved, see value in work)	Looking for student engagement	Yes	This is an effective way to learn

	Timestamp	What would you say was the Level of Engagement for the majority of students in the classroom that you observed?	What did you go to the classroom to specifically observe?	Did you get out of the observation what you were looking for?	How do you feel about this experience?
21	2/21/2014 15:35:14	Authentic (actively involved, see value in work)	How the students were learning. How could I improve my classroom teaching?	Yes	positive, inspired to learn and so more for my teaching
22	2/23/2014 11:27:58	Authentic (actively involved, see value in work)	I went into to this class not sure what we were going to observe. It was great to see some of my actual students in a different environment and seeing how they behaved and their level of work.	Yes	It was very enlightening
23	2/23/2014 11:30:19	Authentic (actively involved, see value in work)	The use of google docs	Yes	It was a very well thought out lesson, there were technical glitches but they were handled amazingly well and it was a learning experience for all involved.
24	2/24/2014 7:40:02	Authentic (actively involved, see value in work)	Student Engagement and Technology Resources	Yes	Very Valuable
25	2/24/2014 8:43:08	Authentic (actively involved, see value in work)	I went to observe girls freshman team basketball practice.	Yes	I learned something.
26	2/26/2014 11:51:48	Authentic (actively involved, see value in work)	technology	Yes	taught me
27	2/26/2014 11:56:08	Authentic (actively involved, see value in work)	a lesson	Yes	it was beneficial

	Timestamp	What would you say was the Level of Engagement for the majority of students in the classroom that you observed?	What did you go to the classroom to specifically observe?	Did you get out of the observation what you were looking for?	How do you feel about this experience?
28	3/24/2014 6:40:49	Authentic (actively involved, see value in work)	use of technology in geometry setting	Yes	It was enjoyable. The kids were a little distracted by our presence but overall they were engaged using the technology
29	3/23/2014 16:50:06	Authentic (actively involved, see value in work)	Lesson incorporating the Latitude	Yes	Very helpful
30	4/8/2014 20:18:51	Ritualism (just going through the motions)		No	
31	4/17/2014 15:43:03	Authentic (actively involved, see value in work)	use of technology	Yes	good

APPENDIX B

IRB APPROVAL STATEMENT/EMAIL

Approval Statement regarding Human Subjects and the Institutional Review Board

A preliminary review of the methods for collecting information from human subjects determined that the methods proposed for this study did not meet the federal definition of "human subject's research with generalizable results." As the proposed information gathering methods are within the general scope of activities and responsibilities associated with my current position, I was not required to seek human subject's approval.

Approval Email regarding IRB

Dear Bianca, Alan, Michelle, Daphne, Melissa, and Billy,

The IRB has determined that your proposed ROS plans do not require IRB approval. Once the fall internship begins, you will be able to begin collecting information to frame your problems as soon as we complete preparations to "frame" your ROS problems. I would suggest that you re-read the documents associated with the Cohort III Interim Report and begin reading your text for the internship:

Cuban, L. (2001). *How can I fix it? Finding solutions and managing dilemmas: An educator's road map*. New York, NY: Teachers College, Columbia University.

With my best regards,

Dr. Carol Stuessy, Director
Online Ed.D. in Curriculum and Instruction
Department of Teaching, Learning & Culture

APPENDIX C

SLL LEARNING EVALUATION STUDY CHECKLIST AND

STEPS FOR THE STUDY

☐ Manilla Envelop with this CHECKLIST and needed materials Inside

☐ SLL Observation Reflection Sheets (2) – Do not put your name on these sheets – only the name of the teacher you observe and the period. This will preserve your anonymity

☐ Map of rooms participating in SLL study

☐ Magnetic Clip for SLL indicator sheets

☐ Plastic Cover for SLL indicator sheets

☐ 3 SLL indicator sheets (one red, one yellow, one green)

- Fill out this google link, https://goo.gl/forms/ABzgTMHtLlIFdDeH3 so Ms. Peltier can send you a spreadsheet of all of the room #'s, teacher names, class periods, and subjects where you can perform your SLL peer observation.
- Complete the Pre-Observation Survey

STEPS for the SLL Study

1. Perform 2, 10-15 minute, SLL observations for two different teachers indicated on the map. Please complete these observations during the period(s) requested on the spreadsheet obtained from Ms. Peltier.
    a. Fill out the Observation Reflection Sheet for both observations
    b. Once you choose a teacher and period to observe, please check their indicator sheet posted outside their room:
        i. Green – come in and observe
        ii. Yellow – come in and observe, but I am trying something new
        iii. Red – today is not a good day for an observation
    c. Please have your two observations completed by 4/14/17
2. Beginning tomorrow and for the duration of the study – please change the indicator cards outside your door as you see fit according to the color key listed in #4. The observation portion of the study will conclude on 4/14/17.
3. Once your observations are complete, please put your two Observation Reflection Sheets back in the original envelop – it has already been addressed to Ms. Peltier. Please put it in inner office mail to ensure she receives it.

4. On 4/14/17 – Ms. Peltier will email you a link for the Post-Observation Survey. Please complete this survey by 4/19/17. At that time your participation in the study will be complete. Thank you for participation.

If you have any questions about this study, please email me, Cynthia Peltier, at cpeltier@ccisd.net or call me at 281-284-0098.

APPENDIX D

SLL OBSERVATION REFLECTION SHEET

Name of teacher you observed: _____

Date of Observation: _____

Period: _____

	1 Not observed/ not demonstrated	2	3	4	5 Observed/ demonstrated to a great extent
Look Fors:					
Classroom management:	☐	☐	☐	☐	☐
Attention to access, equity, and diversity:	☐	☐	☐	☐	☐
Involvement of all students:	☐	☐	☐	☐	☐
Using assessment in instruction:	☐	☐	☐	☐	☐
Using questioning and discussion techniques:	☐	☐	☐	☐	☐
Student generated ideas/questions:	☐	☐	☐	☐	☐
Connection to other disciplines:	☐	☐	☐	☐	☐
Investigation/problem-based approach:	☐	☐	☐	☐	☐

Your reflections - i.e. how did this observation influence your practice:

APPENDIX E

RHS PRE-OBSERVATION SURVEY

In answering the following questions, consider all the professional learning opportunities you have participated in during your tenure as a teacher.

- Professional learning refers to any activity that enhances your professional knowledge and skills which includes, but is not limited to, in-service training, teacher networks, course work, institutes, committee work, and mentoring.
- In-service training is professional learning offered by RHS or RISD.
- Workshops are short-term learning opportunities that can either be located at your school or elsewhere and institutes are longer term learning opportunities (a week or more in length) occurring off campus.

The following questions are asking the impact you feel different types of professional learning activities will have on your teaching practice. Please answer each question to the best of your ability even if you have not participated in the activity.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

1. Conferences and workshops will improve my teaching practices (on subject matter, methods, or other instructional topics).
2. When learning, I prefer to have a choice in the topic.
3. Participation in a teacher study group will improve my teaching practice (ex. Book study/lesson study).
4. I find value in receiving feedback from my peers.
5. I believe that peer observation will improve my teaching practice.

6. I believe participation in a teacher network structured around professional learning will improve my teaching practice.
7. I learn best when professional learning occurs during instruction in the regular school day.
8. I believe the school and administration should decide and plan all professional learning opportunities for the staff.
9. I believe mentoring another teacher will improve my teaching practice.
10. I believe that the RISD coaching model will improve my teaching practice
11. I believe that other science teachers can improve by observing my classroom.
12. When learning, I prefer to have a choice in the method of delivery of the information.
13. Listening to a guest speaker or expert will improve my teaching practice.
14. The best profession leaning experiences occur as isolated events such as teacher in-service days.
15. I believe that teacher collaboration is a powerful tool for professional learning.
16. I prefer professional learning activities that can be immediately adapted to my classroom.
17. I believe teachers have the ability to drive their own professional learning.
18. I believe that the longer I am a teacher, the less professional learning I need.
19. I believe that I can learn from other teachers at RHS.
20. Teachers must continue to learn researched based best practices throughout their career.

Demographics

1. What is your gender?
   ☐ Male
   ☐ Female

2. How long have you been working as a teacher?
   ☐ This is my first year
   ☐ 1-5 years
   ☐ 6-15 years
   ☐ 16 – 25 years
   ☐ More than 25 years

3. How long have you been employed at RHS?
   ☐ This is my first year
   ☐ 1-5 years
   ☐ 6-15 years
   ☐ 16 – 25 years
   ☐ More than 25 years

4. What is the highest level of formal education that you have completed?
   ☐ Bachelor's Degree
   ☐ Master's Degree
   ☐ Doctoral Degree

5. How many hours of traditional professional learning have you engaged in during the past 12 months?
   ☐ 0-20 hours
   ☐ 21-40 hours
   ☐ 41- 60 hours
   ☐ 61-80 hours
   ☐ More than 80 hours

6. How many hours of JEPL have you engaged in during the past 12 months?
   ☐ 0-20 hours
   ☐ 21-40 hours
   ☐ 41- 60 hours
   ☐ 61-80 hours
   ☐ More than 80 hours

7. Have you previously participated in SLL or any other peer observation program?
   ☐ Yes
   ☐ No

APPENDIX F

RHS POST-OBSERVATION SURVEY

The following questions are asking the impact you feel different types of professional learning activities will have on your teaching practice as well as evaluative information of the SLL program. Please answer each question to the best of your ability even if you have not participated in the activity.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

1. Conferences and workshops will improve my teaching practices (on subject matter, methods, or other instructional topics).
2. When learning, I prefer to have a choice in the topic.
3. Participation in a teacher study group will improve my teaching practice (ex. Book study/lesson study).
4. I find value in receiving feedback from my peers.
5. I believe that peer observation will improve my teaching practice.
6. I believe participation in a teacher network structured around professional learning will improve my teaching practice.
7. I learn best when professional learning occurs during instruction in the regular school day.
8. I believe the school and administration should decide and plan all professional learning opportunities for the staff.
9. I believe mentoring another teacher will improve my teaching practice.

10. I believe that the RISD instructional coaching model will improve my teaching practice.
11. I believe that other science teachers can improve by observing my classroom.
12. When learning, I prefer to have a choice in the method of delivery of the information.
13. Listening to a guest speaker or expert will improve my teaching practice.
14. The best profession leaning experiences occur as isolated events such as teacher in-service days.
15. I believe that teacher collaboration is a powerful tool for professional learning.
16. I prefer professional learning activities that can be immediately adapted to my classroom.
17. I believe teachers have the ability to drive their own professional learning.
18. I believe that the longer I am a teacher, the less professional learning I need.
19. I believe that I can learn from other teachers at RHS.
20. Teachers must continue to learn researched based best practices throughout their career.

STOP Light Learning Program Evaluation

1. I believe the SLL program has helped me improve my teaching ability. (2)
2. I believe the SLL program is an effective way for all STEM teachers to improve instruction. (1)
3. I believe the SLL program should be continued at RHS. (3)
4. Improvements can be made in the SLL program at RHS. (3)

5. SLL is a more effective vehicle for job-embedded professional learning than other activities provided by the RISD. (3)
6. I believe SLL is an effective program for all teachers at RHS. (1)
7. I would recommend participation in the SLL program to my peers. (3)
8. I will continue to participate in the SLL program at RHS. (1)
9. I believe I can learn from other teachers, through the SLL program, outside of the STEM department. (2)
10. The SLL programs allows me to control my professional learning. (1)
11. I like that the SLL program occurs in real time, in a classroom with students. (1)
12. I have been able to apply learning from my SLL observations immediately in my classroom activities and lesson plans. (4)
13. Reflection is an important part of the SLL program. (4)
14. The SLL program has changed how I question students in my classroom. (4)
15. I shared information I learned as a result of my SLL activities with my peers. (3)
16. I learned more about student engagement through my SLL activities. (2)
17. I changed how I structure my classroom as a direct result of SLL activities. (4)
18. My time was well spent engaging in SLL observations. (2)
19. I focus more attention to how I assess students as a result of my SLL observations. (4)
20. The SLL observations helped me acquire the intended knowledge and skills I anticipated from the PL. (2)

Short Answer Questions

21. If you feel improvements can be made to the SLL program, please list them in the text box below. If you feel no are needed, please indicate that as well.
22. How does SLL compare to other job-embedded professional learning opportunities provided by the campus or district? Please use the text box below.
23. How does the SLL initiative meet your needs as a professional learning program as an STEM teacher at RHS? Please use the text box below.

APPENDIX G

PRE- AND POST-OBSERVATION SURVEY COMPREHENSIVE RESULTS

Pre-Observation Results (*N* = 28)

#	Question	Mean	Median	Mode	*SD*
Pre-1	Conferences and workshops will improve my teaching practices (on subject matter, methods, or other instructional topics).	3.9	4	4	0.91
Pre-2	When learning, I prefer to have a choice in the topic.	4.5	5	5	1.09
Pre-3	Participation in a teacher study group will improve my teaching practice (ex. Book study/lesson study).	3.8	4	4	0.88
Pre-4	I find value in receiving feedback from my peers.	4.2	4	4	0.93
Pre-5	I believe that peer observation will improve my teaching practice.	4.1	4	4	0.88
Pre-6	I believe participation in a teacher network structured around professional learning will improve my teaching practice.	4.2	4	4	0.98
Pre-7	I learn best when professional learning occurs during instruction in the regular school day.	3.6	4	4	0.78
Pre-8	I believe the school and administration should decide and plan all professional learning opportunities for the staff.	2.2	2	2	0.94
Pre-9	I believe mentoring another teacher will improve my teaching practice.	3.9	4	4	0.88
Pre-10	I believe that the RISD coaching model will improve my teaching practice.	3.7	4	4	0.91
Pre-11	I believe that other STEM teachers can improve by observing my classroom.	3.7	4	4	0.89
Pre-12	When learning, I prefer to have a choice in the method of delivery of the information.	4.0	4	4	1.01
Pre-13	Listening to a guest speaker or expert will improve my teaching practice.	3.1	3	3	0.74
Pre-14	The best profession leaning experiences occur as isolated events such as teacher in-service days.	2.5	2.5	2	0.84

Pre-15	I believe that teacher collaboration is a powerful tool for professional learning.	4.4	5	5	0.98
Pre-16	I prefer professional learning activities that can be immediately adapted to my classroom.	4.4	5	5	0.98
Pre-17	I believe teachers have the ability to drive their own professional learning.	4.3	4.5	5	1.00
Pre-18	Teachers must continue to learn researched based best practices throughout their career.	2.3	2	2	0.93
Pre-19	I believe that I can learn from other teachers at RHS.	4.5	5	5	0.98
Pre-20	I believe that the longer I am a teacher, the less professional learning I need.	3.9	4	4	0.92

Post-Observation Results (*N* = 25)

	Post-Survey Questions	Mean	Median	Mode	*SD*
PO1	Conferences and workshops will improve my teaching practices (on subject matter, methods, or other instructional topics).	4.1	4	4	0.73
PO2	When learning, I prefer to have a choice in the topic.	4.6	5	5	0.57
PO3	Participation in a teacher study group will improve my teaching practice (ex. Book study/lesson study).	3.9	4	4	0.53
PO4	I find value in receiving feedback from my peers.	4.5	5	5	0.51
PO5	I believe that peer observation will improve my teaching practice.	4.2	4	4	0.66
PO6	I believe participation in a teacher network structured around professional learning will improve my teaching practice.	4.2	4	4	0.66
PO7	I learn best when professional learning occurs during instruction in the regular school day.	3.5	3	3	0.96
PO8	I believe the school and administration should decide and plan all professional learning opportunities for the staff.	2.2	2	2	0.71
PO9	I believe mentoring another teacher will improve my teaching practice.	3.8	4	4	0.76
PO10	I believe that the RISD coaching model will improve my teaching practice.	3.8	4	4	0.58
PO11	I believe that other STEM teachers can improve by observing my classroom.	3.7	4	4	0.74
PO12	When learning, I prefer to have a choice in the method of delivery of the information.	4.3	4	4	0.68

PO13	Listening to a guest speaker or expert will improve my teaching practice.	3.4	3	3	0.57
PO14	The best profession leaning experiences occur as isolated events such as teacher in-service days.	2.6	3	3	0.86
PO15	I believe that teacher collaboration is a powerful tool for professional learning.	4.7	5	5	0.48
PO16	I prefer professional learning activities that can be immediately adapted to my classroom.	4.5	4	4	0.51
PO17	I believe teachers have the ability to drive their own professional learning.	4.5	5	5	0.59
PO18	Teachers must continue to learn researched based best practices throughout their career.	1.9	2	2	0.67
PO19	I believe that I can learn from other teachers at RHS.	4.6	5	5	0.50
PO20	I believe that the longer I am a teacher, the less professional learning I need.	4.2	4	4	0.76