ARBORETUM: A CASE STUDY USING PROBLEM BASED LEARNING TO BETTER UNDERSTAND SCHOOL CHANGE

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Education
by
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ABSTRACT

This study uses a case study methodology to understand how Problem Based Learning (PBL) influences teachers’ perceptions of school change. A PBL is a simulation. As such, the participants engaged with the PBL Arboretum in a safe environment that enabled them to challenge school culture and propose different solutions to all the issues presented in the PBL. This case study also aims to understand how a PBL can help teachers to establish a common vision for school change.

The PBL Arboretum was designed for this study and was tested in a pilot study before it was implemented. This PBL involved teachers in a simulation that encouraged them to take risks without fearing negative effects from their ideas. This was achieved thanks to a well-designed and administered PBL. As the PBL Arboretum resembled the school where this study took place, it allowed participants to express their ideas, including different perspectives that challenged Arboretum and their school’s current culture, in a safe environment.

The study was conducted in the Groove (pseudonym) private school in Bogota, Colombia. Five different groups solved the PBL in a three-day seminar. In that period of time, the participants were observed, two anonymous surveys were implemented, and a final presentation was given by each team. In the next two weeks, five interviews were completed, and each team submitted their final product.

The findings describe how teachers were able to work collaboratively through the PBL Arboretum. The participants were empowered to think about school change by solving a simulation, and the PBL provided a safe environment with rules and roles constructed by each team that led the teachers to have an effective collaboration, build knowledge, and share with each other as they built a common vision for school change.
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CHAPTER 1

Introduction

Much has been written about school change and its connection to teacher involvement, but there have been no studies about school change involving the use of Problem Based Learning (PBL) and teachers’ perceptions of school change or of how PBL can help teachers establish a common vision for school change. Ravitz (2009) conducted a meta-synthesis of meta-analyses on PBL’s effectiveness, and while the author reviewed some studies, his conclusions called for new research on PBL focusing on teacher effects.

PBL has its roots in medical education; however, Barrow (1985) presented the taxonomy for PBL methods by writing that PBL “… does not refer to a specific educational method. It has different meanings depending on the design of educational method employed and the skills of the teachers” (p. 481). Problem Based Learning was later adapted by Bridges and Hallinger (1992) with the objective of preparing future school administrators for leadership roles. When future school leaders are instructed using PBL, the starting point for learning is a problem they would likely face in their future careers. Furthermore, the curriculum for PBL is organized around problems rather than disciplines. In contrast to traditional administrator-preparation programs, where instruction for learning rests for the most part on the professors, PBL allocates most of the responsibility for learning on students working collectively. Learning becomes a shared experience, most of which happens collaboratively rather than individually. Bridges and Hallinger (1995) argued that PBL offers a unique bridge between academic theory and practical application, making that argument at a time where there was a great deal of dissonance separating these two sides. Not only did Bridges and Hallinger develop a methodology that brought together practice and research, but they also presented an instructional methodology that blended educational objectives with educational experiences.
Problem based learning (PBL) has enjoyed success as a means of preparing future administrators, but it may have even greater potential. As schools rely more and more on teacher collaboration and problem solving, PBL may hold promise as a means of professional development for teachers as well. In particular, using PBL to have teachers participate in problem solving may be a strategy for involving teachers in engaging the broader problems facing the whole school community. Further, PBL experiences may prepare teachers to assume more leadership responsibilities, as suggested by reformers who champion concepts such as professional learning communities (PLCs) (Dufour and Eakers, 2008). PBL could also be a mechanism to better prepare teachers to participate in the difficult process of school change.

The complexity of school change can be studied using different theories. Two examples are the change theories of Fullan (2003) and Hall and Hord (2006). The common ground for both theories is that change is a process or a journey, rather than a singular event. Both theories acknowledge that it takes time to change, and people and their reactions are the most important considerations in any change initiative. As school change is complex, it does not easily follow a blueprint. All schools are also unique, and because schools are systems, they are connected to their environment, which is another key component for change. Likewise, school change can only occur when people within the organization change; therefore, everyone in the school may be seen as a change agent.

When teachers, principals, and the community create a new vision for the school, a new challenge emerges, which implies new ways of doing things. In this era of school change, that challenge translates into a renewed focus on student learning. Change needs leaders who will facilitate collaboration on school transformation because such an enterprise requires people to work in the same direction, toward a common vision, and to support each other. As change starts, new problems inevitably come to light, and leaders should be ready to support teachers in solving such issues. Changing a school’s culture is a complicated task because the change to the culture has to address both detail and dynamic complexity (Senge, 2010). In detail complexity, there is a
direct relationship between causes and effects, while in a dynamic complexity there is an indirect relationship between cause and effect, and different ideas must be theorized. As systems have so many connections, and some of those can be unpredictable, the cause and effect relationship can be difficult to analyze in detail (Senge, 2010). But that does not mean those interested in the process of change should be dissuaded from studying it.

For this study, using PBL as a catalyst for change allowed participants to focus on the detail complexity of the issues being addressed. PBL is conducted in teams, since much of the learning has to do with interpersonal relationships in problem solving. PBL also usually requires a final product that forces each team to see how each issue relates to school change and how those connections shape a bigger picture. Schools are systems, and many of the connections within them are hidden. In a car, when you push the brake, the effect is immediate. On the other hand, Senge (2010) reminds us, “When obvious interventions produce nonobvious consequences, there is dynamic complexity” (p. 71). School change requires that we see both types of change: detail complexity and dynamic complexity. It requires that we see the small details and the extensive picture. PBL as a catalyst offers an innovative approach to promoting school change, because it challenges participants to see issues both ways, in detail and dynamically.

Finally, to change a school’s culture is one of the most complex tasks of all. A school’s culture is what lays beneath habitual behaviors that are not clear for everyone. “The way we do things around here” is involuntary, especially when teachers are working primarily in isolation. Thus to change culture there must be structures that support change efforts. For instance, change strategies presented by DuFour, Eaker, & Many (2010), DuFour & Fullan (2013), Dufour (2004), and DuFour, Eaker, & DuFour (2008) described a method of cultural change that transforms schools into Professional Learning Communities, or PLCs.

This study aimed to investigate how teachers respond to a PBL on school change. It offered a unique opportunity for teachers to work together in a realistic simulation. With little threat or consequences, teachers were invited to address school dilemmas that were realistic but
not real. PBL situates teachers as decision makers in solving whole-school problems, thus giving them a voice in whole-school change, a role that many teachers have not been afforded. By using a PBL in this way, the study aimed to capture their insights and reflections about participating in collaborative problem solving about whole-school change.

School change requires support from the administration, but whole-school change also requires a shared vision that includes teachers and other stakeholders (Sergiovanni and Starratt, 2006), in that it requires some degree of participation from all members of the community. Such an enterprise is complex, requiring resource allocation that creates and supports a coalition of people willing to make change. As complex as change is, and given that schools are systems, the outcomes of different change initiatives may not come to light immediately. For example, without guided reflection, teachers may not express thoughts about the impact of their role on school change. Of course, some results may not be tangible for weeks or even years. But I believe there is much to be learned from teachers as they participate in collaborative problem solving about school change. My study of the role of teachers during this process was guided by Fullan's (2007) principles and the theories of Hall & Hord (2006) on how to implement change in complex systems such as schools.

The following case study of how to initiate cultural change undertaken through the unique approach of this study makes a significant contribution to our existing knowledge. It is a case study focused on the effects of PBL on teachers that aims to discover how Grove School’s (a pseudonym for the actual school where the study took place) teachers felt about working together on a PBL that could empower them on their journey in educational change. Throughout the study, I endeavored to understand what teachers thought when they read the PBL, how teachers responded when their voices in each group empowered them, and how they felt about working in groups solving a realistic dilemma. Of interest as well was the extent to which teachers create a climate for a Professional Learning Community because of the characteristics embedded in PBL.
Ravitz, (2009) took a step toward the future of PBL research in education, and in doing so called for research that informs both practice and policy. Furthermore, the author explained that “other sources of variation may include teacher effect and professional development” (p. 6). Through this research, I examined whether or not PBL may awaken change in a school toward becoming a PLC. The essence of the PBL developed for this study focused its goal on the creation of a product that aims toward the conception of a professional development program. In addition, the study answers Strobel and Barneveld’s (2009) call for “solid research base in need in other disciplines and contexts” (p. 55).

As this research focused on the school change process, it also contributes to the understanding of complex school phenomena and knowledge of an organization (Merriam, 1998; Yin, 2013). Furthermore as this study examined contemporary events (school teachers working on a PBL and presenting solutions to change the school’s current culture), teachers’ behaviors could not be manipulated. Therefore, observation of teachers solving a PBL as well as surveying and interviewing those teachers were the factors that differentiated this case study from an historical case study (Robert K Yin, 2013).

**Main Questions:**

How does PBL influence teachers’ perceptions of school change?

How does PBL help teachers establish a common vision for school change?

**Sub questions:**

1. What effect does participation in Problem Based Learning have on teachers’ perceptions of school change?

2. How does PBL affect teachers’ perception of collaboration with their peers?

3. How does PBL affect teachers’ perception of collaboration with school administrators?

4. How does teachers’ experience influence their decision-making processes?
5. How do teachers understand their role in school change?

How does participating in a PBL influence teachers’ readiness for participating in a Professional Learning Community?

**Grove School**

The study took place in Grove School (pseudonym), an actual school in Bogota, Colombia. To provide context, the following is a brief description of the school’s history: Grove School was founded in 1945 in Bogota, Colombia after the Second World War. At that time it was a monolingual single-sex school (only girls), and its goal was to educate girls and prepare them for married life. It should be noted that in Colombia there are 11 grades, as Colombian schools have an additional transition grade between kindergarten and first grade. As a result, students graduate from 11th grade but complete 13 years of education.

In 1956, the first graduating class of only four students received its diplomas. The school had an outstanding beginning: high-income families enrolled their girls in the school under the direction of its first principal and owner. As time went by, the programs were consolidated and families looked forward to sending their children to this school. Over the years as the founder grew old, the school declined. Applications decreased, and the school had financial difficulties that threatened its operation. The second generation of school leaders was able to save a little of the school’s reputation, but the glory days were thought to be over.

The story that is presented in this introduction focuses on major changes implemented by the subsequent generations of faculty and administrators. The school had to reinvent itself under the guidance of the current principal, and it was this innovation and characteristic of adaptation that guided the school to change its fate into what it is today.

In 1993, the school had 59 teachers and 659 students and was on the cusp of a major change. The following year, the school switched from using a monolingual to a bilingual curriculum and changed its name to represent that bilingual curriculum. This transformation also
came with the addition of pre-kindergarten in order to support the new curriculum. As a result, the student population increased to 698 students and three more teachers were added. After 1994, the school changed its academic calendar from one that began in February and ended in December to one that began in September and ended in June.

In the academic year of 1997-1998, after implementing several parents’ suggestions, the school opened its doors to coeducation with gender perspective. That means that boys and girls were instructed in different classrooms but remained together in cultural or daily activities such as lunch, recess, sports, and other events. Throughout this time, the school continued its growth, enrolling 960 students and employing 78 teachers.

In the academic year 1999 - 2000, national standardized tests began to offer school results by city and by country. That year the school was ranked 18th in its city and 112th in its country. In the year 2000, applications for new students increased, as expected, and the school had 1030 students and 87 teachers. In 2007 - 2008 the first bilingual graduates received their diplomas. That year the school grew in students as well; it had 1265 students and 118 teachers. That year also had the last female graduating class, and for the first time the school was ranked first place on the national standardized test.

For the academic year of 2009 – 2010, a third language was introduced into the curriculum: Mandarin. From that year up to the present, all second grade students have been learning their third language prior to ninth grade. Additionally, this was the first time the school graduated both boys and girls. That year the school had 1368 students and 139 teachers. The school continues growing to this day. In the academic year of 2014 – 2015 there were 1672 students and 144 teachers (Grove, 2013, 2014).

At the time of this study, the school was once again on the cusp of a generational change. Current veteran teachers had been in the school for more than 20, 30, or even 40 years. Their time to retire was approaching.
Over time these experienced faculty had crafted their teaching and leadership, not only through the learning that occurred in the classroom, but also through the wisdom they had acquired from experience. Many had mastered a “sixth sense” that allowed them to find outstanding talent in teachers applying for a position in the school. Furthermore, in the school’s current culture they had been able to guide new teachers to flourish. The questions that now needed to be asked were: why did some new teachers leave the school, or on the other hand, how is it that other new teachers had settled and flourished?

**Professional Learning Communities**

Professional Learning Communities (PLC) can be seen as a vehicle to change the school’s current culture of isolation that was growing among newer faculty at Grove School. PLCs are characterized by a culture of collaboration. Specifically, teachers collaborate toward a school improvement effort. PLCs are marked by cultures where students are learning not only by being taught but also by way of collaboration with their teachers (Dufour, 2004). This improvement offers time for teachers to engage in inquiry projects where they are able to share their experiences, and veteran teachers are able to bring knowledge that has been internalized to light—the “sixth sense” mentioned above. PLC is a system change theory; the whole system has to change. Schools that aim toward PLC have to reevaluate their policies about how students learn as well as how teachers work and learn.

In Grove’s culture there were teachers who were used to working in some degree of isolation with few opportunities to share what was going on in their classroom or to reflect on issues that arose from daily practice. As novices, isolated teachers had a workload that seemed beyond all bearing. They had to control and organize classroom management, conduct parent conferences, and manage curriculum issues, evaluation, and school culture (Feiman-Nemser, 2003). Finding routines day in and day out, novice teachers were only able to juggle all their requirements and survive. As routines took over novice teachers’ daily work, there wasn’t a gap
for risks. Likewise there wouldn’t be a space to question if there was a better way of teaching or lesson planning. Novice teachers would learn what would be evaluated and adapt their routines to the evaluation; thus in the end, the only change would be determined by the evaluation.

The risk for such cultures is that evaluation is not a path to develop teachers; instead, it provides a minimum requirement for teaching. In such a system, novice teachers are able to survive the potential for burn out and align with these cultural standards in order to stay at the school; however, those who had a different perceptive on teaching are pushed away to other professions. Ingersoll & Smith (2003) explained how attrition is higher in novice teachers. In their study they found “between 40 and 50 percent of all beginning teachers have left the profession” (p. 2). Current Grove teachers had assimilated; they adapted to their routines, with few options for collaboration, and in the end the culture tended to favor isolation over collaboration.

Veteran teachers accrued knowledge over a period of time when Grove underwent many changes. Those veteran teachers had to grasp key knowledge that had crafted what Grove was today. In the school’s current culture, there were not enough opportunities to share that knowledge with newer Grove teachers. Therefore, if the school and its culture did not change, the knowledge that teachers had crafted over decades would be lost.

PLC challenges school cultures by “altering long held assumptions, beliefs, expectations, and habits that represent the norm of people in the organization” (DuFour & Fullan, 2013, p. 2) and focuses on collaboration and inquiry cycles that better serve the students (DuFour, Eaker, & Many, 2010). For Grove, this new approach to the school’s culture aspired to challenge teachers who were working in isolation and bring those teachers into a new culture.

Newer Grove teachers were so overloaded with the school’s demands that few had realized the value provided by veteran teachers. They also realized that veteran teachers would be leaving the school in years to come. For that reason, Problem Based Learning offered a unique opportunity for this study. The methodology of PBL relies upon a simulation, so it provides a safe
environment for teachers to work together and solve a messy issue that may or may not deliver outcomes that could be implemented in the school that the PBL is based on.

**Problem Based Learning and Professional Learning Community**

The purpose of this part of the introduction is to direct the reader’s attention to the wider scope within which this study takes place. Much has been written about school change. For example Hall, (1973) presented the Concerns-Based Adoption Model or CBAM. Kotter (1996) introduced eight stages of process to create a major change. Fullan's (2007) theory introduced change as a three-phase process, and DuFour & Fullan (2013) worked on Professional Learning Communities. However, there are no studies about school change that focus on the use of PBL as a catalyst for change. This road to the use of a PBL begins with the issues that a school faces when change occurs. Fullan (2007) explained that there could be multiple factors that affect the initial decision for change. This study aims to be dynamic in the use of PBL, not only as an instructional tool, but also as a mechanism of school change in how PBL empowers teachers to become involved.

For this study, a PBL called Traditional and Growth at Arboretum was designed (see appendix 3). This PBL was based on Grove School, and there were many similarities between the PBL and the actual school. This PBL was a messy one, with enough material for participants to be challenged in solving different issues.

Bridges & Hallinger (1995) outlined eight goals for a PBL, and those goals were intended to become the trigger for the Arboretum PBL to be used as a catalyst for school change. As Grove teachers embedded in the Arboretum PBL suggested for this study, they would need to prepare themselves and the school for their future reality. As such, problems had a high impact, and teachers were going to be introduced to new knowledge that was relevant to solve the issues presented to them. As the Arboretum PBL would foster a secure place for applying and testing
knowledge, Grove teachers would have a setting where they could discover how their new knowledge would become a key component to face their coming future and realize if there were gaps in their current understanding. Furthermore, they could rely on peers to fill those gaps in their knowledge. As change implies dilemmas, where new knowledge challenges old ways, teachers working on Arboretum PBL would be able to develop skills focused on problem solving. These skills would assist them in the implementation of their solutions to the Arboretum PBL.

**Pilot Studies**

Two pilot studies were done in preparation for this major study. The first pilot study was a PBL, *Tradition and Growth at Arboretum: A Problem Based Learning for Educational Research*, which focused on testing the PBL developed for this study. This pilot was a PBL that was very similar to Grove School. Encouraging findings resulted from this first experience, which brought about a restructure of the PBL. Furthermore, this pilot study pointed out flaws that could never have been foreseen. For example, in the PBL, *Tradition and Growth at Arboretum*, there was a lack of supporting material. Also, as one component of the pilot, one teacher in the Arboretum PBL had left the school, and it seemed like no one could replace her. This one issue became the focus of the solutions offered in the pilot study, drawing participants’ attention away from the larger issues that needed to be solved.

**Pilot Study No. 1: PBL Tradition and Growth at Arboretum: A Problem Based Learning for Educational Research**

A PBL project prototype called *Tradition and Growth at Arboretum: A Problem Based Learning for Educational Research (Arboretum PBL)* was written for this study. This PBL was developed under the frame presented by Gall, Borg, & Gall (1996), which introduced the Educational Research and Development model (R & D). This type of research fits into PBL as it was adapted by Bridges & Hallinger (1995). There are ten steps in the research and development cycle proposed by the authors. The fourth step is the Preliminary Field Test and Product
Revision. As the *Arboretum PBL* was developed, it needed to be tested and revised, so this was the purpose of the first pilot study.

**Background**

This first pilot study was conducted at The Pennsylvania State University in Spring 2014 with students enrolled in a graduate class of curriculum and instruction in the College of Education. This group of 10 students was the first to test the PBL *Tradition and Growth at Arboretum*. This first pilot study had 5 meetings in which students faced a simulation or scenario and prepared their product and final presentation. The final presentation was done over Skype with two representatives of Grove School. Students were challenged to identify the problem and identify a solution.

**Findings Arboretum PBL**

This pilot study focused on testing the PBL *Tradition and Growth at Arboretum*. This PBL was developed as closely as it could be to the school that would be the setting for the dissertation. Key components of the PBL were addressed and needed to be tested. A PBL has to be messy, as real life is, and typically it must be both relevant and realistic for those facing it. Furthermore, the reader must be provided with sufficient information to solve the issue presented in the PBL (Bridges & Hallinger, 1995).

The first finding was that there was a lack of information relevant for problem solving in the PBL. Students were presented with key information about the school, but during the process they required more information. This information was evaluated and did not downgrade the purposes presented in the PBL (Bridges & Hallinger, 1995). Furthermore, during the process new support documents were developed and presented to the teams solving *Arboretum PBL*. Those documents became part of the new and improved PBL.

The second finding was in the PBL itself. Students that faced the PBL focused their answers on one issue that emphasized on how one teacher, Fernanda, left the school with the
knowledge she crafted over years and how the students suffered that loss. This piece of the puzzle was there to offer evidence that Arboretum’s teachers did not share ideas, how Arboretum had lost knowledge, and how a culture of isolation would only work against the best interests of the school, students, teachers, and community. This was one of the problems encountered in the PBL at Arboretum, but the solution seemed easy and straightforward, the principal rehired the teacher for three more years, so for that reason it was adapted. In the presentation of the final product of this first pilot study, students focused on how Arboretum needed to develop the knowledge that left with one teacher, which took energy away from focusing on how to change the school culture. The result of this finding led to the modification once more of the PBL Tradition and Growth at Arboretum; the Fernanda situation was adapted, and that issue was addressed.

**Pilot Study No. 2: PBL A Supervisor's Dilemma: Planning for Change at Unison Elementary School**

In the summer of 2014, Grove School and 20 of its teachers were enrolled in pilot study using a PBL named “A Supervisor’s Dilemma” (appendix E). When the PBL Tradition and Growth at Arboretum was discussed with my dissertation committee, the suggestion was made that PBLs that were close and personal to teachers at Grove School could alienate teachers from the issues presented in the PBL and that their products, experiences, and efforts would not trigger a change the school culture toward a PLC. To address this suggestion, a pilot study of the PBL A Supervisor’s Dilemma was conducted in Grove School.

**Participants**

There were 5 teams of 5 teachers each, all from Grove School. Teachers were presented with resources to solve the PBL. Four topics were presented to the teachers before they could work on the PBL. The first topic was Personal and Professional Leadership Development, the second was Group Facilitation Skills, the third was Collaborative Decision Making, and the last was an exploration of a Professional Learning Community (PLC). At the end of the workshop,
teachers were presented with the PBL *A Supervisor’s Dilemma*.

For this pilot study, teachers were selected by taking into consideration the number of years of experience they had in the school and/or area in which they worked. All the teachers were distributed in groups in which members had the same characteristics. The rationale for group selection focused on three aspects. For the first two groups, the rationale for grouping was the sources of authority. There are four sources of authority: bureaucratic, personal, professional and moral authority. Bureaucratic authority refers to the power associated with a hierarchical position (Sergiovanni & Starratt, 2007). Personal authority refers to team leaders or any “teacher’s ability to use motivational techniques and to practice other interpersonal skills” (p. 28). Professional authority “is based on the informed knowledge of the craft of teaching and on the personal experience of teacher” (p. 31). Finally, moral authority’s focus is on the commitment that teachers have toward their community, in view of shared values and ideas (Sergiovanni & Starratt, 2007). Taking into consideration the different types of authority, teams were sorted according to how every member could share their authentic voices without being influenced by teachers with different sources of authority.

The first two teams were composed of veteran teachers with 15 years or more of experience at the school. In addition, those teachers were also content area leaders, which meant they had a bureaucratic authority over all the teachers. They also had a personal authority due to the characteristics of their job. Content area leaders had to work with all the teachers in a specific area. For example the math department encompassed all math teachers of the school under the direction of the math content area leaders. The content area leaders had to work on curriculum, evaluation and follow-up with every member of the team, as well as teach. In addition, team area leaders were part of the “consejo academic,” or academic council, which had to make decisions on curriculum, evaluation, professional development, and far more. The role these teachers played in the school implied recognition of their leadership and experience as educators in the
community. In the sorting process, when other teachers were grouped with content area leaders, their voices could become biased because of the leadership and influence that content area leaders had in the school. For these reasons, content area leaders were selected to work in groups separate from other teachers. As some other participants were novice teachers who followed directions from the content area leaders, their voices in particular could be silenced by deference to their content area leaders.

The third team was a selection of teachers with 10 - 15 years of experience. These teachers were being groomed to become content area leaders in the future. In the same way, these teachers also developed their personal, professional and moral authority within the school. They were the right hand (and in some cases right and left hands) of their content area leaders. Their experience in the school and leadership had put them on the path of becoming the next content area leaders. Their knowledge and understanding of the school gave them a unique approach to solve school issues. On the other hand, their loyalty to their content area leaders could bias their decisions in the same way the content area leaders biased other teachers.

The fourth team was the novice team, consisting of teachers with 3 or fewer years of experience in the school. With new ideas and different perspectives, novice teachers can challenge the status quo. To do so they should be in a place where they feel comfortable, and what better place than with peers with the same characteristics.

Finally, the fifth team was a selection of pre-k to transition teachers. Teachers in preschool are not under any content area leader; they work with the preschool immersion leader, the preschool coordinator, and the vice principal. This team of teachers could offer a different perspective due to the nature of their organizational arrangement and the differences in their daily work. Similar to schools in the U.S., preschool at Grove School had homeroom teachers. The preschool has a total immersion program in which students are exposed to English in 90% of their classes. For that reason, this team of pre-k to transition teachers was selected to be part of this
unique experience. Usually only one person represented each group of teachers, but for this pilot study the whole team was invited. Teachers were selected to participate, and each had the option to be part of the study or not. One content area leader decided not to participate because she was too busy working with part of her team.

**Data Collection**

This pilot study provided a unique opportunity to test data collection. The first source of data was observation and field notes. The second source was the evaluation presented to each participant. The third was the evaluation paper written by each team member at the end of the workshop. Finally, the fourth data collection tested was the product presented by each team at the end of the PBL.

**Observations**

Observation and taking field notes are complex tasks. Observations add to the data collection process because they take place within the process, so there is no controlled setting as there is in the interview. This amplifies the details of observations, which have no filter; observations are firsthand data (Merriam, 1998). Taking field notes provides a space for the researcher to write down what happened. Field notes are descriptions of people, places and activities, but they can also be hunches, reflections, or records of ideas that come to the researcher when he or she is in the field (Bogdan & Biklen, 2006). This pilot study made it clear that field notes could remap the first idea of data collection.

During the first days of the PBL, participants were given the option of working with a survey that questioned how teams make decisions. The purpose of this survey was to understand how teachers made decisions before and after their work in the PBL; it was a pre- and post test. Unfortunately, the instructions given to teachers were not as clear as they should have been, so participants answered both surveys by focusing on their daily work and not on the learning and experience they had during the second pilot study. The bottom line was that instructions were not
clear, and the results of this survey were compromised in the pre- and post-test. The key learning from this process was to make very certain that directions were clear enough so that teams could solve the problem without outside assistance.

**Evaluation**

One source for evaluating this experience was a survey—an evaluation that participants filled out—which revealed that one of the most valuable experiences of such work was the possibility to work in groups. Sixteen out of twenty-four teachers highlighted group work as one of the most valuable aspects of the seminar. One teacher reported that the most rewarding aspect was the “exercise [involving] group work because usually our daily work tends to be individual.” A second teacher reported that the exercise “verifies that the work in interdisciplinary teams is not only possible, but highly productive.” This was evidence not only of how much group work was valued in this school’s culture but also of how isolation in the classroom had become the constant (Sarason, 1996). One explanation for why teachers valued this teamwork so much was that it was unusual to find spaces where teachers could think and work on something different than their daily practices.

Grove had built two types of meetings into its teachers’ schedules. The first was a content area meeting in which all teachers of the same area, for instance Spanish teachers, worked with the content area leader on curriculum and issues around teaching. The second meeting was a level meeting, so all teachers that taught 5th grade got together and reflected on the performance of students within that level. What usually happened was that this time was used for disciplinary issues, and inquiry for growth was not on the agenda.

**Reflection Paper**

A third data source comes from a teacher reflection paper. We asked teachers to answer five questions about this simulation:
1. What makes Grove School a great place to work?

2. What would you like it to become?

3. What reputation would you like it to have?

4. (Complete the following sentence) I want Grove School to be a place where...

5. When I leave Grove School I want to be remembered for...

Through this source of data, key components came to the light. One teacher answered that Grove was a school where teachers had “opportunities to learn at school, from one another, and in other institutions... I can continue to growing as a professional and as a person... we can discuss, agree or disagree without hurting others.” Another teacher reported, “happiness toward knowledge on behalf of its students and teachers.” A third teacher answered, “I would like to have the reputation of building community.” These arguments are congruent with DuFour, Eaker, & DuFour’s (2008) six characteristics of effective PLCs. Thus there are beliefs among teachers and the community that could support a change in Grove School toward a PLC.

Other teachers addressed how Grove School was “innovative in its methodologies, practices and educational thoughts” and how the culture also “supports new projects.” Another teacher said, “I want Grove School to be a place where no one is afraid of making mistakes.” This statement presented an invitation to take risks, which is a key component of inquiry and action in the classroom. According to these data, it could be suggested that some members of the community were endorsing some of the behaviors and ideas of a PLC. Furthermore, some teachers also suggested that Grove School had to keep changing and taking risks to change. The idea of a community learning together must be inherent, at least to some degree, in the school’s culture, and the teachers’ responses reflected this idea.

This second data source was one that allowed me to become an insider in what teachers
thought about Grove School. This was an opportunity to learn about the school’s culture, as well as the teachers’ openness to change, and what type of change they were expecting.

**PBL Product**

The last set of data came from a written paper that each team presented at the end of the PBL. In those documents, a common theme appeared, which was the need to create a coalition to support change. One group suggested a plan that was built on the core values that most teachers agreed upon. This plan was also supported by strategies that endorsed communication and how teachers were part of the decision making process. As a result of these two structures, this team suggested the idea of creating close relationships among teachers. Furthermore, this team suggested the need for a community that had the knowledge to inquire and solve problems. Finally, the last suggestion from this particular team was the need for the support from the board, principal, and so on. Beyond the need for support, the team described the need for the trust that teachers would be able to find effective solutions. The core of this change, as the group presented it, was to create leaders inside the institution.

The team of new teachers, who had three or less years in the school, argued that parents were an important piece to solve the *Supervisor’s Dilemma*. This idea would have to be embedded in the Arboretum PBL, and it was not taken into consideration. A second suggestion of this team was to focus on how *Unison*, the school of the *Supervisor’s Dilemma*, had to find a common purpose. This group said, “*Teachers must find unity of purpose about what teaching is and what it means. Furthermore, teachers and the school must understand how that unity of purpose aligns with the school’s objectives and community needs.*” Effective PLCs must have a common purpose, but that common purpose implies not only finding where the school needs to focus its efforts, but also a mindset of accountability for all community members (DuFour, Eaker, & DuFour, 2008). Moreover, this team added the concept of a learning community and how the school had to reevaluate its perception of the type of community that it was. Likewise, sharing
was also a theme described in this team’s final report, to “develop mechanisms that would allow experience to be transferred, so individual experiences can become experiences for the community.”

One of the veteran teachers’ teams suggested how veteran teachers could become coaches in the coming future. The main role of those coaches would include induction programs for new teachers. This proposal of this team aimed toward a culture of change in the school. They were looking forward to breaking the isolation in the classroom so that new teachers would be embedded in a different culture. What was not clear from this solution was how much time novice teachers would have for coaching and whether or not teachers would work alone in the future.

The second veterans’ team focused their solution on teamwork and sorted Unison’s faculty in five groups. Each group had a specific project: math, reading and writing, arts and sports, English as a second language, and special ed. Evaluation of each team was embedded in the solution, each team had a different evaluation system, and in the end, each team could share their successful experiences. In addition, these veterans also added parents as a core part of their proposal. Finally, this group of veteran teachers’ solution added the implementation process for how to make change possible to the solution. In short, this team of veteran teachers was practical.

The PBL products offered outstanding data to analyze. A deep understanding of the problems posed by the PBL engaged participants in a discussion and brought them to create solutions as a team, where consensus needed to be found in order to make decisions. Such decisions focused on school change, and those are the types of decisions that reflected how a new desire for change comes from the teachers. Teams and teachers must be provided with structures that support PLCs, and support for a cultural change that can be traced in their PBL products. Teachers have a voice and experience in problem solving, problem finding, and PBL, and in the end they shared solutions to a problem they found within the PBL. Collective problem finding
and solving aligns with the characteristics of PLCs, and I expected to find in the study that teachers would come to understand the value in working together and learning from peers, but at this point in the research, this remained to be seen.

**PBL Unison Learning**

**Interview**

In this second pilot study there were no interviews. At this point, I felt overwhelmed by the data that was collected. After reviewing the data, questions had arisen, such as why the veterans did not give a voice to the teachers of *Unison School*. In every item they presented for the teachers, all decisions were made by others. On the other hand, the novice teachers’ product focused on change and gave a voice to current teachers. Was this a generational difference, or was it just a matter of perspective? One possibility was that certain voices controlled the group’s dynamics and decisions. Interviews would offer a deeper understanding of the product presented by each team and would enrich the perspective of each participant (Bogdan & Biklen, 2006).

Interviews would also offer meaning to what was observed during the time that teachers worked together in solving the PBL and presenting their solutions. Additionally, as the *Arboretum PBL* was a close and personal PBL to this school, understanding what it meant for each group to be part of the solution of the problem stated in the PBL offered them a voice and a unique opportunity to develop their own plan for school change. What was important to one group might not be important to another, and finding discrepancies and similarities among groups would nurture this study (Krathwohl, 2009). It was clear from this pilot study that interviews would assist my understanding about whether or not a PBL may influence teachers’ perceptions of school change and if a PBL helped teachers establish a common vision for school change.
Pilot Studies’ Findings

These two pilot studies offered unique insights for this study with different lessons from each pilot. The first lesson focused on observations. In each of the pilot studies, a common theme was for teams to gather together to solve the PBL in a different setting where I could conduct observations. In both cases, when the final presentation and product were presented, there was no link between my field notes, the presentation, and the final product. This is one limitation of the study. One reason for this discrepancy could be how technology has changed the way we work. Teams might have worked collaboratively over the Internet by using the cloud or e-mail. This gap has to be closed because observations of these communications could redefine my interviews. A second possibility is that teams divided their work. Teams would work together defining issues for the PBL and afterward divided the issues so that each member solved them individually and then, finally, reviewed solutions and commented on them.

The second lesson focused on time. When participants started their work, time went by quickly. There was not a moment to reflect on a change; that was why the plan had to be set before starting. It was clear that things could change but my reflections needed to be written every day. For both pilots, I made some reflections and wrote them down. These reflections became the product of what I had learned from these two experiences. As a result of these reflections, the interview questions could be reshaped.

The third lesson focused on my own silence. Participants were eager for more information in both pilots, and from time to time I jumped in and answered those questions. As a result, I think I may have guided the participants to the answers that I was expecting, and by doing that I constrained groups from finding their own paths. With that in mind, some questions
needed to be answered for the participants, but before answering them I needed to reflect on how to answer them without biasing the groups with my expectations.

The fourth lesson had to do with the differences between the groups. Groups had different dynamics, and sorting groups randomly could work when groups are homogenous, but when participants had different power roles in the sample, the products and groups’ dynamics would lean toward that figure of power. For that reason, I sorted each group\(^1\).

The fifth lesson was to allow time for participants to have small chats and to make those chats part of my data collection. The main reason was that in those small chats participants felt confident about sharing the idea of having a PBL that really reflects their reality. Teachers thought that their work would mean much more if their time were invested in something productive for the school. One teacher said, “I would like to solve a PBL that really impacts me.” It is in those chats that teachers were able to express their own opinions.

As a final point based on my findings, lessons, and experiences from both pilot studies, I decided to study the change process using PBL as the catalyst. In both processes, teams worked together addressing issues presented in both PBLs and came up with innovative solutions. In the end, the experience of teamwork and having the space to reflect on the PBL offered learning opportunities for teachers that they would not have otherwise had. PBL offered time for the participants to solve issues about schools together, to which no one knew the answer. Thus, we were able to engage teachers in solving and gearing their knowledge toward the benefit of the group. If the final product can become a road map that teachers for the school actually work on as, a coalition, as Kotter (1996) described, this would thanks to the PBL, and the change process would be initiated. On the other hand, the PBL could also establish a sense of urgency for change

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\(^1\) In the second pilot study veteran teachers were in one group. All of those teachers had been in the school for 20 years or more. Not only are they seen as leaders but they are also bosses of other participants. So in the end I chose to keep the groups segregated, in the same way I did for the second pilot study, even though random selection would support in some degree of validity for my study.
(Fullan, 2007). Finally, depending on this study’s findings, PBL can become an effective method of cultural change in a school.

Summary

The purpose of this chapter was to outline and describe the problem of school change in a specific context, present the research questions, establish the need for such a study, and describe the contribution this study makes to the understanding of how PBL might be used to change school culture and create a learning community. The setting of this study was enriched by the PBL “Tradition and Growth at Arboretum” because of its similarities with the current setting for the study. In addition, this chapter also provides a conceptual framework for the study. PBL has been used for instruction in different fields and in education, but as it was structured within this study, I was able to study if PBL influences teachers’ perceptions of school change and whether PBL helps teachers establish a common vision for school change, including the adoption of PLCs, which offer an opportunity for change that challenges the school’s current culture and fosters a transfer of knowledge between one successful generation of teachers to the next.

The purpose of this chapter was also to provide evidence for how the PBL Tradition and Growth at Arboretum was tested and redefined thanks to the first pilot study at Penn State. Learning from that experience allowed me to adjust the PBL so the teams solving it could focus on school change and not on solving one dilemma posed by a teacher that retired from the school. Likewise, A Supervisor’s Dilemma: Planning for Change at Unison Elementary School also offered the opportunity to test whether or not teachers in this case were willing to face a personal issue or preferred to work on a PBL from an unfamiliar school.
CHAPTER 2
A REVIEW OF THE RELEVANT LITERATURE

In Chapter One I justified the need for this study and discussed how PBL may influence teachers’ perceptions of school change and help teachers establish a common vision for change. Chapter One described a real setting and provided a review of two pilot studies, one of which focused on testing a PBL as a tool by itself. The other pilot study focused on a PBL that was not as close and personal to Grove School as the Arboretum PBL. The final section of the chapter presented lessons from both pilots and how those lessons have informed this study.

Before a school develops a change plan, it needs to know how everything fits together. Teachers working in isolation are not able to see beyond their own classrooms or, in Grove School’s case, their own content area for most cases. This is not their fault, it is a matter of school culture and the school’s arrangement of teachers’ schedules, so that when the bell rings and class is over, their work is done for the day. At Grove School, professional development opportunities were only found in universities, outside of school, and knowledge had become private because there were not structures and time allocation to transfer that knowledge.

This next section concentrates on reviewing the literature that informed this study. The first part reviews Problem Based Learning (PBL). In order to do so, it starts with PBL’s history and how it began in medicine and spread over many fields including education. Afterward, the second section explains how PBL became a powerful instruction methodology for future principals and leadership development. The third section reviews PBL in Educational Leadership and key structures that support PBL instruction. The fourth part focuses on the obstacles that a teacher must overcome if he or she is willing to use PBL in his or her instruction. As a final point for this PBL section, there is a review of how PBL has been used in other academic literature and dissertations.
Problem Based Learning

PBL is an instructional methodology that originated in medical education. PBL is a unique curriculum and instructional approach that sets a stage on which students face complex and interdisciplinary problems drawn from professional experiences (Bridges & Hallinger, 1992). The PBL methodology was an answer from the medical education community to critiques made concerning their new pool of doctors in the early 1980s. The four main critiques focused on how new doctors were not prepared for life-long learning experiences due to their constant dependence on their teacher. There was also a lack of care for their patients, as doctors were not learning how to work with their “clients.” One key target for medical students was memory. The field was trying to deal with the issue that knowledge was forgotten upon graduation. Finally, medical students’ learning was so separate from their practice that new doctors lacked the ability to apply what they learned (Hallinger & Bridges, 2007).

The first task is to define PBL and its origins. I will start with medicine and move on to how PBL’s features are also seen in education, as PBL has different meanings and characteristics in education. Barrows, as cited by Savery (2015), presented the essential characteristics for PBL. The first refers to how students are responsible for their own learning. The second centers on the type of problem, noting that PBL problems must not be structured, so the PBL allows participants to have inquiries. Just as in real life, problems do not have a clear solution, this approach gives a space for participants to develop skills in problem solving. The third characteristic is that learning must integrate different disciplines in the same way that people integrate information from different sources in a real life situation. The fourth feature is collaboration. Each participant has to learn and develop skills and share information with team members. The fifth emphasizes self-directed learning and how such learning must reframe the analysis of issues and the PBL. The sixth focuses on debriefing, which refers to the learning that occurred from working and solving the PBL. The seventh is self and peer assessment after each PBL, and the eighth is that “the activities carried out in problem-based learning must be those valued in the real world” (p. 7).
PBL has been adapted for many other disciplines (Gijselaers, 1995) and has various forms and definitions depending on the fields in which it is used. For example, in medicine Barrows (1996) argued that PBL methods have the capacity to achieve medical educational objectives such as structuring of knowledge for use in Clinical Context (SCC), the development of an effective Clinical Reasoning Process (CRP), the development of effective Self Directive Skills (SDK), and the increase of Motivation for Learning (MOT) (Barrows, 1986). Stinson & Milter (1996), explained that at Ohio University the MBA uses a PBL method because it allows students to develop skills such as communication, collaboration, and teamwork.

Although there are different models of PBL, the one used in this study is drawn from Bridges and Hallinger (1995). They defined sixteen features for PBL. Their model of PBL is a problem centered one, in which students lead teams, and it also emphasizes analysis, life-long learning, problem solving skills, meeting and problem management, implementation, and consequences. Students determine the class time, and teachers are guides. The basic unit of instruction is the project developed by students and not the PBL itself. One key characteristic is that problems are seen as the starting point for learning new content. Also, the PBL model presented by Bridges and Hallinger focuses on the emotional side of leadership and how participants achieve results through others. Finally, this PBL model centers its formative evaluation on realistic performances (Bridges & Hallinger, 1995).

The second step is to review what has been written about PBL. For this stage, I reviewed papers with a clear view and definition of PBL, along with different studies concerning the effectiveness of PBL as an educational method.

Albanese and Mitchell (1993) conducted a review of the literature on PBL, focusing on outcomes and implementation issues in medical education. They reviewed 17 studies, and from those, ten studies were selected as data that measure the National Board Medicine Exam 1 (NBME1), which focuses on the assessment of understanding and concept application. The other seven studies used outcomes from the NBME2 with measures application of knowledge, skills,
and student understanding of medicine. Among the results from this meta-analysis, students who worked within a regular curriculum outperformed students who used PBL. Furthermore, PBL students felt they were not as exposed to all the content as the students working within regular instruction. However, PBL students felt an advantage over regular curriculum students in problem solving, self-learning skills, recollecting information, and self-evaluation.

Newman (2003) studied 12 papers on medical education. He focused on papers that offered evidence of an effective PBL. In his results, he agreed with Albanese and Mitchell on the idea that traditional curriculum students outperformed PBL students. In addition, PBL students were found to lean towards PBL instruction.

Duch, Groh, & Allen, (2001) argued that the PBL method would offer the solution to what the Wingspread conference (1994) demanded from new undergraduates. In the Wingspread conference, business corporations, universities, and accreditation communities discussed the quality of undergraduate education. From that conference, a list of characteristics for undergraduates was presented, the last of which was, “Demonstrated ability to deploy all of the previous characteristics to address specific problems in complex, real-world settings which the development of workable solutions is require” (p. 5). Duch, Groh, and Allen (2001) found that one path to address a change in undergraduate education was inquiry-based instruction, mainly PBL methodology, because this methodology would allow undergraduate students to achieve what the market would require from them upon graduation.

Finally, one PBL that was applied to education was presented by Delisle (1997). He modified Barrow’s goals for medical students and adapted such goals to K-12 students, saying that students should learn the core information, understand it, and have an active use of such new knowledge (Delisle, 1997). This PBL is a method to promote authentic learning that can be applied to a variety of contexts and is being implemented across numerous disciplines.

The second task for using the PBL was to describe the big but complex picture to teachers, so that they could find out how pieces fit together. This is the purpose of *Tradition and*
During this experience, teachers came to understand what it means to participate in PBL, which is an instructional methodology that rests on the assumption that both knowing something and using that knowledge are equally important. Furthermore, people engaged in PBL bring their own knowledge to the table. When that knowledge is activated, people are motivated to incorporate new knowledge. PBL encourages learning in a setting that resembles that in which the knowledge is going to be used in the future (Bridges & Hallinger, 1995). A PBL designed for school change takes into consideration the school’s current needs, creates a scenario where school’s faculty are able to envision the coming future, and incorporates their knowledge about the school culture, teaching, school change, and so on. Therefore, PBL offers a unique opportunity for the instruction of future school leaders, placing them in complex situations, working with peers to solve issues that they might encounter in their future career (Chrispeels & Martin, 1998).

School leaders and administrators face complex, unclear, messy situations, where time becomes a luxury. Therefore, school leaders who are able to work in teams and connect their abstract knowledge to problems they are facing will excel in their careers. Leaders in PBL instruction learn by doing, as it is here that leaders are placed in a real world setting and learn while making decisions and offering solutions to problems that they are likely to face in their careers. The advantage is that PBL offers a controlled setting outside of day-to-day activities. That characteristic sets up a unique opportunity for future teachers or principals to reflect upon and anticipate their daily issues. To do so, school leaders must have “a cohesive set of skills in order to solve the problems they encounter on a daily basis in their schools” (Chrispeels & Martin, 1998, p. 305).

It is not common for universities to instruct their students with learning activities that enable students to grasp the reality of a school, its issues, and the nuances that impact decisions (Daresh & Playko, 1992). Moreover, there are routine problems that teachers solve day in and day out, but there are also problems that require time to step back and reflect on possible solutions. To
do so, educators must master the skills they need to become effective problem solvers (Chrispeels & Martin, 1998).

Leithwood, Begley, & Cousin (1992) found that skills such as *interpretation, goals, principles and values, constraints, solution processes, and affect* are the key elements for school leaders when they are solving unfamiliar problems in collaboration. Not only do these skills enable leaders to become expert school administrators or teachers, but they also enable teachers to assume roles as leaders. Leaders should understand how to make a clear *interpretation* of a problem, explain it to others, incorporate others’ interpretations into their own interpretation, and determine how this interpretation of a problem relates to the school’s mission. Furthermore, there should be more than one *goal* when a team is solving problems, and expert school leaders should share their goals for problem solving with the team. *Principles and values* should guide school leaders in their decision making process. Sharing is a common theme for school leaders, so sharing the process of developing goals for problem solving with their staff avoids *constraints* to possible results that the team could produce. In the *solution process*, leaders are not only able to anticipate possible obstacles when the team is solving a problem, but they are also able to adapt and be effective when unanticipated obstacles arise. Finally, school leaders have to hold the line when they approach problems that *affect* the solution process (Leithwood et al., 1992).

Problems can also be addressed in two ways, alone or in groups. School leaders who are efficient in solving problems must keep their minds open to multiple solutions or perspectives. Hence, sharing common goals as well as constraints for the problem to be solved are key ingredients to a team that is efficient and knows how to solve common problems (Leithwood et al., 1992). Furthermore, teachers assuming leadership roles must understand team dynamics, such as being an effective listener and maintaining a respectful environment at all times. This is essential so that teams can allocate their energy to solve problems. Finally, those who participate in solving problems are the ones who have a voice, and the leaders must open a space for
collaboration, taking into consideration each problem’s traits and the different stakeholders (Chrispeels & Martin, 1998).

PBL has brought up several questions for different authors. There is no common ground upon which to compare and contrast PBL instruction and traditional instruction. On one hand, some students in regular instruction have outperformed students in a PBL instruction (Albanese & Mitchell 1993; Vernon & Blake 1993; Berkson 1993; Kalaian, Mullan & Kasim 1999; Newman 2003; Dochy, Segers, Van den Bossche & Gijbels 2003). However, one reason for students in traditional instruction to outperform PBL students may be related to the type of evaluation applied at the end of the term (Albanese & Mitchell 1993). In particular, PBL seems to fall short on multiple choice questions and progress assessments (Newman, 2003).

Students in PBL instruction practice working in groups so that learning becomes a group responsibility, and usually team members distribute the group’s work. Students contribute their knowledge, and over time they become a cohesive team. In their professional life, if students face isolation in their work, PBL students may have problems learning individually and issues may come to the light (Albanese & Mitchell 1993). This is not usually the case in medicine, unless students are sent to a rural area.

On the other hand, for exams that focus on free recall and short answers, PBL outperform regular instruction. Furthermore, PBL students develop other skills that could play a significant role in their future. For example, Albanese and Mitchell (1993) found that PBL students were selected as the first choice for residency positions at a higher rate than traditional programs. Finally, PBL instruction favors long term learning and performance improvement (Strobel & Barneveld, 2009).
PBL in Educational Leadership

The third PBL section of this chapter focuses on how PBL is an instructional methodology that would allow prospective principals to develop characteristics that would enhance their future roles. PBL in education focuses on how to develop skills for solving problems and building knowledge for educational administrative practice (Bridges & Hallinger, 1992). As explained before, school leaders must have a set of skills that would allow them to solve problems. PBL methodology is the instructional path that would allow future leaders to prepare themselves for problem solving in teams, where they are able to set goals and understand and incorporate different perspectives from team members. PBL teaches individuals to be flexible enough to overcome even unforeseen obstacles. As future school leaders work in teams, they need to understand how respect and the atmosphere that they are able to provide for their team are key components to achieving their goals.

This same abstraction of knowledge and application places future school leaders far from the real circumstances of a school when they encounter undefined problems. All their knowledge might be nascent until they learn how to apply what they knew to difficult and complex situations. PBL instruction supports school leaders in learning, helps prevent rash decisions in the case of a real problem, and offers a unique opportunity for learning in the supported and controlled space of a classroom.

However Gijbels, Dochy, Van den Bossche, & Segers (2005) question the effects of PBL in higher education. Higher education students are required to solve complex problems efficiently. PBL is an instructional methodology that teaches graduate students to achieve this goal. They found that “students in PBL seem to possess a highly structured network of concepts and principles” (p. 46). Yet this study was not able to answer the question of whether PBL enables students to solve complex problems efficiently. Only 8 of 40 studies focused on solving complex problems and addressed solving complex problems efficiently. Aaron et al. (2009) compared two classes taking the same course with a “major emphasis on the pathophysiology of
disease” (p. 87). One class followed its standard method (1994). The second class (1995) followed a PBL method for a large portion of the course that used to be a lecture. Both classes were tested with a year-end exam and a research-based exam in clerkship skills. In their results, the authors reported that the 1995 class was significantly lower in all their subjects. On the clerkship performance, the 1995 class had similar results to the 1994 class. In short, compared to the class with no PBL material, the PBL class had lower results. As a conclusion, the authors suggested that PBL offers specific advantages when students are faced with questions that require a concept of elaboration compared with knowledge that is not linked together (Aaron et al., 2009).

As dynamic and interesting as PBL could be in teacher learning, there is an area that has not explored what PBL has to offer (Ravitz, 2009; Strobel and Barneveld 2009). PBL offers a controlled setting where teachers and principals work together to solve problems and requires the team to make decisions in real life settings that any school could undertake. As a result, PBL becomes a window to study how teachers and educational leaders make decisions and how their decision-making process works in a controlled setting. Hence, this perspective of PBL has not been studied and becomes a path to contribute to PBL literature in future research.

Problem solvers and teachers in leadership roles must have the ability to see multiple perspectives. A retrospective was done by Distlehorst & Robbs (1998) for three years, which focused on students at Southern Illinois University (SIU) School of Medicine. At the end of the study, the authors were able to find that there was no major disadvantage for those students who enrolled in a PBL curriculum compared with those in traditional curriculum. The authors reported that PBL students “performed well on their clinical rotations” (Distlehorst & Robbs, 1998, p.135), but there was no comparison with students in traditional curriculum.

In the case of school administration, Bridges & Hallinger, (1995) presented a PBL
approach that “involves the development of a conceptual or theoretical framework that is applied towards the analysis of a salient problem drawn from theory, empirical research, policy or practice” (p. 116). Real school problems are not well defined because they involve many different stake holders and possible outcomes. School leaders can easily become overwelmed. PBL offers a unique opportunity to prepare school leaders for what they are going to face once they are in schools, as it focuses on knowing and doing. This is where PBL’s strength lies: it challenges the concept of knowledge and states that a person’s ability to use knowledge is equally important. Furthermore, the advantage of the learning process in PBL is that students would need to apply their knowledge in a similar context to that which they will be exposed to in their future careers. Moreover, the authors argued that “prior knowledge is activated and they are encouraged to incorporate new knowledge into their preexisting knowledge”(Edwin Bridges & Hallinger, 1995, p. 5).

**PBL Obstacles for School Leaders**

The first obstacle in implementing the PBL methodology for school leaders is that the development of different PBLs requires a high time investment. University professors must develop PBL projects, which in the best scenarios would require at least 3 weeks, or 120 to 160 hours to create, test, and review one PBL (Bridges & Hallinger, 1995; Bridges & Hallinger, 1992). On the other hand, when the costs of PBL are compared to conventional lecture-based instruction, PBL requires groups to have fewer than 40 students, compared to lectures that may have 80 students. One drawback is that PBL would only cover 80% of the curriculum compared to regular lectures (Albanese and Mitchell 1993). Finally, Albanese and Mitchell did not take into consideration the development of PBLs for the lecture classes.

The second obstacle in implementing PBL methodology for school leaders is that university teachers work in a setting in which PBL methodology is not one of the foci of its rewards system. Universities have tended to favor research, publication, and fundraising over
teaching to some degree. As would any other professional, professors would focus their work on maximizing their rewards so that promotions and salary increases could be attained (Bridges & Hallinger, 1992).

The third obstacle in implementing PBL methodology for school leaders is that university teachers would be required to spend more time with students, and the proportion of students should not exceed 15, because managing more than three teams could become impossible. Furthermore, as PBL teaching is not widely accepted, some universities demand that professors also teach courses in a conventional way. In the end, professors could be spending double or triple their preparation time when they choose to follow a PBL methodology (Bridges & Hallinger, 1992).

University professors could find alternative paths instead of developing their own PBLs. As more teachers use PBL for teaching school leaders, professors could adapt PBLs from other sources, such as peers or other universities. A second path is to create PBLs with graduate students who are also working professionals and are exposed to daily challenges and situations in their careers that give them enough resources to create PBLs. Furthermore, as these students deal with real issues in their daily lives as teachers, administrators, and principals, it would not be difficult to find enough resources to create PBLs.

One important question is, what would be the incentive for students to follow a path with PBL instead of a traditional teaching method? Problem solving has become a key characteristic that school leaders must have in their repertoire. Leaders in schools that have this ability are more successful than others in their positions as leaders (Leithwood & Montgomery, 1982; Leithwood & Stager, 1989; Leithwood & Steinbach, 1992). Hence, in order to educate principals (or any educational leader) for their future role and future situations, they must be placed in contextualized and controlled problems that they understand and can solve with peers (Hallinger, 2005). “Novices and experts use the same basic processes to solve problems; people get better at
solving problems by building a knowledge based through repeated problem-solving efforts” (Copland, 1999, p. 75).

**Using PBL in Dissertation Methodology**

Hallinger has suggested that using a PBL would be a suitable dissertation methodology.

Traditional programs, according to Bridges & Hallinger, (1995) have four main assumptions:

“The knowledge is relevant to the students’ future professional role; learners will be able to recognize when it is appropriate to use their newly acquired knowledge’ palliations of this knowledge is relatively simple and straightforward and the context in which knowledge is learned has little or no bearing on subsequent recall or use.” (p. 5)

Bridges & Hallinger (1995), argue that PBL methodology assumes that learning has two components, knowing and doing. Under this perspective, knowledge is not the only key component for learning; doing is of equal importance when learning is happening. According to Bridges & Hallinger (1995), students tend to learn new knowledge when three conditions are met:

“Their prior knowledge is activated and they are encouraged to incorporate new knowledge into the preexisting knowledge, they are given numerous opportunities to apply it; and they encode the new knowledge in a context that resembles the context in which it subsequently will be used.” (p.5)

There have been different approaches toward PBL in educational dissertations. For example Copland (1999), studied the relationship between “PBL learning experiences and prospective principals’ ability to interpret and frame administrative problems, and the development of a principal’s self among prospective school administration” (p. 8). The setting that Copland selected to study was the Prospective Principals Program at Stanford; this program had PBL workshops that counted for 40% of the program. To study the principals’ ability to
interpret and frame administrative problems in this dissertation, Copland designed a quasi-experimental, post-test only design (Copland, 1999).

In a mixed-methods dissertation, Banes (2013) conducted a study of how pre-service elementary teachers learned mathematics. The study had two control groups and one experimental group that was instructed with PBL, following almost the same research design as a post-test only control group design (Krathwohl, 2009).

PBL has been used as a treatment in different studies and also as a comparison between one or more control groups in which PBL is used as a treatment. Although competing findings have been made, other dissertations focused on PBL, not as a treatment but as a focus of the study.

Gall, Borg & Gall (1996) introduced the educational Research and Development model (R & D). Their definition of such model was:

“The use of research findings to design new products and procedures, followed by the applications of research methods to field-test, evaluate and redefine the products and procedures until they meet specified criteria of effectiveness, quality or similar standards.” (p. 769)

This type of research fits into PBL as it was adapted by Bridges & Hallinger (1995).

Seven steps in the research and development cycle are proposed by the authors and drawn from Borg and Gall (1989).

1. *Research and information collecting*. The researcher identifies the issues that the product will address in this first step, and as the R & D implies, a product will be developed and studied.

2. *Planning objectives*, learning activities, and small scale testing. In this second step the researcher plans how to develop the PBL project and addresses the first stages of the product, such as learning objectives and the problem.

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2 This implies that there was no random assignment (Krathwohl, 2009).
3. Development of the preliminary form of the product. For this kind of dissertation Bridges and Hallinger adapted R & D, hence the researcher must develop a PBL project prototype.

4. Preliminary field test and product revision. The PBL project is already developed by the researcher and is ready to be tested. At this point the PBL is tested and formative feedback must be collected. A product revision must be done at this stage, so that the final PBL will be ready for the next step.

5. Main field test and product revision. The researcher proceeds to make the implementation of the product and data collection. At that time the product is assessed throughout a summative and formative evaluation

6. Operational field test and final product revision. This is the stage in which the researcher decides if the product that has been developed and tested is ready for educational use. Final implementations could be done in a different educational setting and data collection could lead to a final revision.

7. Dissemination, implementation and institutionalization. The researcher has to inform educational teachers about the product; hence this product can be introduced to different educational programs. Here is a parallel with PBL, where a final product developed is an educational innovation. This one can be introduced to any educational program.

Cagwin (1997) followed Bridges and Hallinger’s R&D research guide in PBL for a dissertation. The purpose of such a dissertation was a PBL that would allow future administrators to learn about:

“…behavioral characteristics of early adolescents, behavioral management theories, the role of the principal as the instructional leader and the effect of student discipline

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3 Formative evaluation: How the product can be improved. Summative evaluation: How efficient the product is.
demands on the principal’s time; the development of group problem-solving skills; and
the integration of theory and practice.” (p. 7)

The product of this dissertation was indeed a PBL, as Bridges & Hallinger (1995), as
suggested by Cagwin, identified a significant problem, gathered data, developed a product,
created learning objectives, and offered useful resources for those solving the product such as a
bibliography, guiding questions, and guidelines for the two-year-plan that people solving the
problem had to develop (Cagwin, 1997). The product was then tested: Data were gathered
throughout the testing, and the products representative of those problems that future school
administrators could encounter in their careers so that the product was relevant to the field.
Finally, Cagwin found that his product, “The Discipline Dilemma,” fulfilled the features of
distinctive problems. It had a

“High impact on the administrator, the organization, and/or clients. Typical, rather than
atypical, of administrator problems. High importance to those experiencing it. Messy,
rather than narrow. Realistic, not contrived. Sufficient information for the reader to know
what is in the situation and to prepare the products.” (Bridges & Hallinger, p. 1995)

PBL can be used with different approaches in educational research; it can be a treatment
for experimental or quasi-experimental designs; it can be used to support an evaluation study; or
it can be used as a case study. Furthermore, it is up to the creativity and imagination of the
researcher to decide how to use PBL to further the knowledge in the field, following educational
research practices.

Educational Change

This section will include an analysis of different educational change theories and how
those theories frame this research. The first contemporary educational change theory is that
presented by Fullan (2007). It encompasses a cycle of three phases, and if change is achieved at
the end of those phases, then change or new practices will be adopted. Furthermore, Fullan also
introduces eight different triggers or initiation decisions that would start change. The second contemporary educational change theory is offered by Hall and Hord (2006) with their 12 principles of change. The third contemporary educational change theory is presented by Kotter (1996) with his eight stages that guide change in organizations.

Most theories seem to only address one facet of an organization, but the fourth contemporary educational change theory, introduced by Senge, Cambron-McCabe, Dutton, & Kleiner (2012), works not only on a specific program but on a whole organization with their five-discipline focus on school change. It addresses change by questioning each member’s view of his or her current reality and desired reality. It evaluates how the school community has to develop a common vision and question their deeply ingrained assumptions and also how those assumptions guide the way everyone sees the world. However, as teachers are not alone and have a common vision, working and learning together is the most reasonable path to follow. In the end, the idea is that everything is connected and that the understanding of such connections is going to support the school learning process and the adaptation to a changing environment.

The fifth contemporary educational change is Professional Learning Communities (PLCs). The core of PLCs lies in cultural change, and that is why PLC is a system change theory: the whole system has to change. Schools that aim toward PLCs have to reevaluate their policies, how teachers work, how students learn and how teachers learn. Teacher isolation is no longer an option. Accountability for all students, and for all other members in the organization is a characteristic of a PLC. Moreover, PLCs focus on student learning at the core and build change from that point on.

**Fullan’s Theory of Change**

The first contemporary educational change theory presented in this section is that of Fullan (2007). This theory introduces change as a four-phase process. Phase I is the adoption or
initiation process of a change. Phase II is the first trial in the implementation of an idea of change. Phase III is continuation, which happens if the change is adopted and becomes part of the system or is just forgotten and all practices come back into place. Finally, phase IV constitutes the outcomes of change, and for this to be evaluated the change must be implemented. Outcomes could be seen as new teaching, mentoring, or coaching roles. The author clarified that this is not a linear process; in some cases it can be chaotic. Changes in this process of adoption could be done during implementation to adjust or redefine implementation (Fullan, 2007).

Fullan’s theory also expanded upon how initiation decisions could be started. He analyzed eight different possibilities such as Existence and Quality of Innovation, Access to Innovations, Advocacy from Central Administration, Teacher Advocacy, External Change Agents, Community Pressure / Support/ Apathy, New Policy, and Problem-Solving, and Bureaucratic Orientations. Any of these possibilities would initiate change in a school.

As Fullan (2007) described, multiple factors could affect the initiation decisions. A key component was to look carefully for the reasons for change, and Fullan (1993) presented eight basic lessons of the new paradigm of change. The strength and power of these eight lessons depend on their collectivity and not on each one by itself.

**You cannot Mandate what Matters**

As change is a complex process, it requires skill and the commitment that all activities require and creative thinking (McLaughlin, 1990); however, only things that do not require thinking can be systematically monitored or mandated (Fullan 1993). As new innovations are introduced, teachers and schools require time to understand and make sense of those innovations in their daily practices. As policy makers have the time to reflect and evolve their idea about such innovations, schools and teachers must be granted the time to understand how these innovations require them to develop new skills, especially the skills that are required to succeed in implementing change.
Change is a Journey not a Blueprint

As complex as each classroom is and as complex as each person is, a blueprint implies that one solution fits all. As new initiatives are proposed and implemented in a school, it is unclear how those initiatives are going to transform current practices, especially how current practices are going to be challenged in by each teacher, so it is not possible to foresee the effects of implementation.

Problems are our Friends

As problems are faced when a new innovation is implemented, this implies, in many cases, that tension exists between the innovation and tradition. Problems are what ignite change, and since change requires a purposeful disruption of equilibrium, problems will rise to the surface when new initiatives are implemented and a new equilibrium is established. Granted, only effective schools focus on problems, ask uncomfortable questions, and find creative solutions.

Vision and Strategic Planning come later

As a school’s leaders are looking for teachers and the community to have ownership of their school vision, that vision has to evolve from the same community, and not a set of words imposed by the administration. Ownership of a vision will be acquired only when learning occurs, and it is when the community is solving problems that learning sparks.

Individualism and Collectivism must have Equal Power

Here there is tension between isolation and group thinking. Teaching in isolation creates a ceiling for teachers’ development. There is no space for inquiry and the status quo will not be challenged. On the other hand, collaboration also requires grounding. Collaboration can guide schools to excel, but teachers could also collaborate in the wrong direction; therefore, schools have to find a balance in collaboration grounded in independent work. Working independently offers the option for teachers to inquire about their practices and opens a door for them to learn.
As those inquiries come to the light, collaboration is the path that allows teachers to find answers and share what they learn.

**Neither Centralization nor Decentralization Works**

A central office cannot oversee everything that goes on in the school. In contrast, content area leaders, working alone, fall into a chaotic situation where every team is pulling in separate directions and there are no synergies and no learning. A balance between both sides is the path that would allow change to happen at schools.

**Connection with the Wider Environment is Critical for Success**

This is a two-way street. Schools are embedded in their environments, but in some cases they seem to forget their connections. Teachers are working toward making a difference, but this does not imply segregation and isolation from the outside. Teachers can learn from other teachers in different schools, and that process is going to raise learning opportunities within the school. The other side of the coin is how the environment can influence the school. If parents are only demanding bilingual education, and a monolingual school fails to listen to the environmental signs, it will fail because that school’s vision disagrees with its environmental demands.

**Every Person is a Change Agent**

If individuals do not change, schools will not change. Teachers have the responsibility to create a school “capable of individual and collective inquiry and continuous renewal” (Fullan, 1993, p. 39). At the end, teachers are the ones working with the students, and accomplishing the core of the school, so if they do not change, things will remain the same.

**Concerns Based Adoption Model (CBAM)**

Hall and Hord (2006) introduced 12 principles of change. These principles apply even if the change is internally or externally initiated. After the researchers had studied change and
change implementation in various settings, they found that “a series of principles will hold true for all cases” (Hall & Hord, 2006, p. 4). As in Fullan’s theory, these principles are not mutually exclusive; however, they do not address all aspects of change.

**Change is a Process, not an Event**

Change does not happen in a school as a result of a workshop or a mandatory implementation of a new curriculum. In order for change to be effective, teachers have to learn new ways, and gradually become skillful, developing new knowledge and grasping that knowledge; therefore, teachers become proficient during an innovation.

**There are Significant Differences Between what is Entailed in Development and Implementation of an Innovation**

A balance of the distribution of resources between development and implementation is a process that is usually overseen by the developers. For change to be adopted in schools, leaders have to allocate the same resources in implementation as in development. Even more importantly, there are key differences between the kinds of facilitators in each stage. In development, facilitators are visible and dynamic, but in implementation facilitators have to be patient. Their role is to support teachers in learning new ways until that new knowledge is mastered. Under that circumstance, facilitators face many questions from teachers, and sometimes the same questions are repeated several times.

**Organizations do not Change until the Individuals within them Change**

As the individuals are the ones implementing change, organizations are only going to be able to change when individuals change. Leaders must foresee how to support change at an individual level.
Innovation comes in Different Sizes

Innovations usually come as a bundle. A curricular change from a monolingual to a bilingual school is one innovation, but there are several small innovations within that main one. Size is also a key component; thus innovations could be as small and simple as an update of computers. In contrast, large innovations become very complex since they could involve changing the school’s culture or the teachers’ practices over five or more years of implementation.

Interventions are the Actions and Events that are Key to the Success of the Change Process

Interventions also vary in their size; a common intervention is a training workshop to explain the innovation. However, the small interventions, the ones found in the small chats in the halls before class, where teachers and principals discuss the innovation, offer a unique opportunity for principals to understand teachers’ involvement in the innovations. Also, teachers feel the support from their principal through such small interventions.

There will be no Change in Outcomes until new Practices are Implemented

Implementation may require years to occur. In addition, implementation may be done gradually throughout the grades in a school, from elementary to middle and high school. In the view that change is a process and not an event, there will be no outcomes until change has been fully implemented and teachers change their practices.

Administrator Leadership is Essential to Long-term Change Success

Teachers could start an innovation and endorse it over a few years, but in the end, if teachers lack the administrative support and resources are not allocated, the innovation will fail.
Administrators have the authority to reallocate resources at any time of the implementations of an initiative: their commitment determines if change is fulfilled or not.

**Mandates can Work**

Priorities can be mandated in some circumstances, but it is clear that change cannot. For instance, a mandate can organize which innovations should be addressed first. Mandates should also be “accompanied by continuing communications, ongoing training, on-site coaching, and time for implementation…” (Hall & Hord, 2006, p.12).

**The School is the Primary Unit for Change**

District-wide innovations focus on changing different schools. As those schools initiate their change process, each school has a different pace and a different implementation process. Each school is different, and each school as a unit needs different support and resources depending on its stage of implementation.

**Facilitating Change is a Team Effort**

School change is an enterprise that encompasses much more than teachers and principals; it also calls for policy makers and the community to work toward change. A segment of the community would be able to accomplish a change initiative in cooperation with the school, and as complex and demanding that change would be, it would also be a team effort.

**Appropriate Interventions Reduce Resistance to Change**

The first intervention focuses on individuals who are resistant to change, and the first approach is to understand why they are resistant to change. Reasons for resistance could be that people are unwilling to change what is comfortable and known. The second option is to question the innovations and whether or not they are going to make a difference in the school.

Finally, change can be painful, and to tolerate and conquer that pain is essential for the future of that change.
The Context of the School Influences the Process of Change

There are two main dimensions that affect change in schools. First is the physical dimension that encompasses school size, facilities and resources. Second is the people dimension that represents the culture and its behaviors, values, and relationships in the school.

Kotter’s Theory of Change

The next contemporary educational change theory is presented by Kotter (1996) who introduced eight stages of the process to create a major change.

Establishing a Sense of Urgency

In this stage Kotter took into consideration the market and competitive realities. This could be aligned with Fullan’s initiation of decision stage. The question is, why is there a need to change, or how does the school better need to prepare students to accomplish what parents, the community, and the universities are demanding.

Creating the Guiding Coalition

The first step in this stage is to create a group that holds enough power in the school so that the group is able to lead the change effort in the school. In addition to creating a group in this stage, support is required so the group can work as a team. What Kotter does not address is whether or not the group is willing to change. The members may fulfill the criteria of having a position of power, expertise, credibility, and leadership, but as good as this looks, if the members do not agree with the change efforts, nothing is going to happen.

Developing a Vision and Strategy

A unique vision would guide all efforts toward change and create major change strategies to achieve the vision that must be developed. Kotter makes it clear that this vision could
come from one member of the group, and then the group would work together and create a final version of it, being that this vision of change is imposed from the top down.

**Communicating the Change Vision**

The school and the group must communicate the new vision using all channels available to them. In addition, members of the group are also role models for what is expected from others. The objective is that all members have a clear horizon, so everyone knows the goal.

**Empowering Board-based Action**

The purpose of this stage is to transform the school’s structures toward change. If some structures are not supporting the new vision and become obstacles, the team must get rid of them. If teaching in isolation is how teachers are used to teaching, breaking that culture is not as easy as turning the page and mandating collaboration.

**Generating Short Term Wins**

Planning to share these wins helps teachers to keep working toward change because they see that their effort pays off. Short-term wins are part of the fuel that keeps teachers and teams eager to focus on the vision and change initiative.

**Consolidating Gains and Producing more Change**

As the celebrations of short-term wins creates momentum and a school must take advantage of the trend, the team is able to grasp bigger challenges in changing projects. With a wider base of people believing in a vision, the team is able to promote those who are working effectively on promoting change.
**Anchoring new Approaches in the Culture**

As change is supported and the team finally reaches its vision, new behaviors are expected and the relationship between those behaviors has to be connected with the school success.

**Schools That Learn**

Senge (2010) stated that in a detailed complexity, causes and effects can be linked together and effects can be clearly traced to their causes. In a dynamic complexity there is just an idea of cause and effect. As systems have so many connections, and some of those could be unpredictable, the cause and effect relationship cannot be explained in detail. Furthermore, one action may not directly show its effect on the long term. Schools are systems, and many of the inner connections may be hidden. Senge (2010) noted that, “When obvious interventions produce nonobvious consequences, there is dynamic complexity” (p. 71). In order to change schools, it is necessary to see change in both ways, linear (detail) complexity and dynamic complexity—in other words, to see the small details and the big picture.

As complex as change is, organizations such as schools live in a changing environment, and those that develop their capacity to adapt to that changing environment are learning organizations (Senge, 2010). The school can become an institution that is able to renew itself, not by a district command, but shifting towards a learning orientation. This process implies that everyone in the organization must be on board for the change, have a voice, share their aspiration, and become aware of the goals and challenges. Finally, everyone in the organization must be able to build their capabilities as a team (Senge, Cambron-McCabe, Dutton, & Kleiner, 2012).

Nowadays, the world demands that people are able to be leaders but also to follow, to understand what governs behaviors, to shape their future, and to question difficult issues. The first discipline is *Personal Mastery*. This is the personal pledge to a vision, a path of excellence, and most importantly a path that involves a commitment to life-long learning. Because schools
are organizations, the vision of each member has to be part of a *Shared Vision* or a clear idea of the future that everyone in the school wants to realize together. Furthermore, in order to start working with *personal mastery* and *shared vision*, school members have to work as a group. That implies learning together and working toward a common organizational goal.

The fourth discipline focuses on perspectives of how people and organizations see their reality. There are deeply embedded assumptions that influence personal and school behaviors, as well as decisions and views of the world; these are the *Mental Models*. Finally, as in any system, everything is linked together. All components of the school are connected, and it is understood that interdependency is what shapes the consequences of actions and decisions.

*System thinking* is the fifth discipline, and it focuses on understanding relationships within the organization, resulting in a common effort toward a collective vision, where the synergies of working together outweigh the work done by teachers teaching alone in their classrooms (Senge et al., 2012).

**Shared Vision**

Senge, Cambron-McCabe, Dutton, and Kleiner (2012) explained how to build a shared vision or a *common purpose* in schools. It is a developmental process of five stages that guide each member toward deep and meaningful conversations in order to achieve a shared vision. There are two variables upon the school’s development in this measure. The first is *degree of active involvement*, and the second is *required capacity for direction-setting and learning*. The essential outcome of such a process is again the commitment to a shared vision.

**Telling**

In this stage, schools are at the lowest point of both variables, and the telling stage describes nothing more than directives coming from the top down at the school. There are possible scenarios where this stage is the best or only option for school administrators to start their work to build a shared vision. As usual, telling teachers what to do is not the best idea in
order to achieve compliance, but there are some recommendations about how to master this first step. Senge et al. (2012) say that administrators should “Inform people directly, clearly and consistently” when the school is in this first stage and speak the truth even though it is hard to hear sometimes.

**Selling**

In this stage, nothing can be mandated. The principal has to sell the benefit of the initiative to teachers, but a key piece is that channels of communications should always be open. In this step, teachers have the opportunity to take a leap of faith toward the vision.

**Testing**

In this stage, teachers are presented with the vision, and their feedback is the key component; the vision is going to be tested. Teachers’ feedback on the vision is the component that matters the most, so the test should be a safe place to share. Doing this test anonymously could open the vision to new ideas that in different conditions could be threatening to share.

**Consulting**

In this stage, the roles are different. Teachers become consultants; this is a space where teachers have a voice in the process. On the other hand, principals invite teachers to develop the vision with open-ended questions, fostering inquiry.

**Co-Creating**

This is the stage in which teachers are able to decide upon their future. It is where everyone is in a creative stage; everything feels like the members’ choice, “because it will be based on their collective thinking and design” (Senge et al., 2012).
Professional Learning Community

The next contemporary theory of educational change focuses on systems as a whole and how to change those systems. The Professional Learning Community (PLC) approach aims to change the culture of schools. This type of initiative challenges arguments like “this is how we do things around here,” or “this is how it has been done for a long time.” PLC challenges school cultures by “altering long held assumptions, beliefs, expectations, and habits that represent the norm of people in the organization” (DuFour & Fullan, 2013, p. 2). In other words, PLCs reexamine how things have been done in schools and chart a new path forward.

Professional learning communities have different meanings in different settings and contexts, but for the purpose of this dissertation the definition is drawn from DuFour, Eaker, and Many (2010). A PLC “is an ongoing process in which educators work collaboratively in recurring cycles of collective inquiry and action research to achieve better results for the students they serve” (DuFour et al., 2010, p.11). This definition brings to the light three different assumptions about what schools or school districts must do as part of their PLC.

Ongoing Process

A PLC implies continuity over time and especially over leaders. PLC is not just a program; it is an innovation that has more than one leader. If a school fails to see and understand the real purpose of PLC, this change initiative will become just like any other program, and as soon as the leader leaves, the PLC will be forgotten and a new program will be implemented.

Educators Work Collaboratively

An isolated culture of teaching has existed for teachers in the school’s induction programs, and the idea of sinking or swimming for some induction programs is challenged with this second assumption. As novice teachers enter the profession in a school where isolation is part
of the culture, those novice teachers who are looking forward to working collaboratively are the ones who soon leave the profession.

**Collective Inquiry and Action Research**

In both cases, PLC implies a change in how teachers are teaching. This approach to education would elevate teachers’ current instructional level so that teachers would become better teachers, and as a result, students would be better served. Hence this implies a cultural change as well. It challenges how things are done and have been done for years. To be successful at this, PLC has to be grounded in key structures to support a systematic change.

**Characteristics of Effective PLCs**

DuFour, Eaker, and DuFour (2008) identified six characteristics of effective PLCs. Each characteristic becomes a journey in inquiry cycles with a clear vision and a way to accomplish results. At the center is learning, not only for students, but also for all community members.

*Shared Mission (purpose), Vision (clear direction), Values (collective commitments), and Goals (indicators timelines, and targets)—all Focused on Student Learning.*

This common purpose creates a clear horizon toward which the community must direct its efforts. Furthermore, a sense of accountability is embedded in these first characteristics because each member has commitments, and it is clear what each member is going to contribute in the effort to create a PLC. Building on the idea that ‘what is not measurable does not count,’ this characteristic has goals and indicators that focus on how teachers are going to improve their schools. Furthermore, timelines and targets will also reinforce the “moral purpose and collective reasonability that clarify why their day-to-day work is so important” (DuFour et al., 2008, p. 15).
**Collaborative Culture with a Focus on Learning**

By working in collaborative teams with a clear direction, assessment, and commitments, a school follows the path, which in time would become the unit upon which the new culture is developed. As these teams work together to achieve goals with a purpose of learning, not only as students, but also as educators, a mutually accountable system will develop.

**Collective Inquiry into Best Practice and Current Reality**

Collective inquiry in PLC implies that teachers are going to focus on their best practices, learning, student assessment, and honest reflection on their current practices. Through collective inquiry, the school is able to build shared knowledge. Consequently, teachers are going to be able to make better decisions.

**Learning by Doing**

Here is a key link to Problem Based Learning where knowledge and doing are essential factors for learning (E. Bridges & Hallinger, 1995). Hence “the most powerful learning always occurs in a context of taking action” (DuFour et al., 2008, p. 17).

**Constant Improvement**

This is a small cycle that starts with evidence of student learning, which guides the strategies that are going to be implemented. As implementation occurs, each cycle must be analyzed to understand what changed and what did not. Finally, as the cycle is over, there is new knowledge, and such knowledge should now be embedded in the system, resulting in continuous improvement.
Results Orientation

At the end of the day, school change requires more than good intentions. Tangible improvement from the starting point must be clear for the community so that as the community learns and keeps trying, it will master new ideas and develop further. As the community starts a path of a shared vision with a collaborative culture fueled by inquiry and action with a commitment toward continuous improvement, results should be achieved.

Three main assumptions are aligned with these six characteristics. The school or the system focuses all of its efforts on learning—not only on student learning but also on teacher learning. A challenge to old cultures is that adults are also learners in PLCs. With this assumption, schools need to assess their current practices, procedures, and policies so that they can support those that are aligned with learning and change those that aim toward a different objective.

The second assumption focuses on learning and how it is a collective process. Students and teachers are responsible for learning and are also accountable to endorse this new culture. Teachers who used to work in isolation have to challenge their practices and open the door to a collaborative culture. Finally, there is the assumption that constant improvement in learning practices aims toward continuous improvement based on evidence. The system that embraces PLC must monitor students’ and teachers’ learning, so that it will build upon new learning (DuFour & Fullan, 2013).

The idea of community goes beyond a collective success story; PLC implies no student segregation. Teachers and students are responsible for learning and especially for achieving goals. If one student is not learning as the PLC vision requires, it is not one teacher’s responsibility to support that student; it is the community as a whole that engages with this student (DuFour & Fullan, 2013). In the end, everyone is doing his or her part, but not in isolation, seeing beyond themselves toward a mutual purpose.
John F. Kennedy said, “Change is the law of life. And those who look only to the past or the present are certain to miss the future.” Change is a process (Fullan 2007; Hall & Hord 2006), and various authors have brought different approaches to light. Through such approaches, there is a common ground about how change works. The first step on the journey to change is to create a critical mass to initiate change (Fullan 2003, Kotter 1996). But those first steps are going to challenge old structures in favor of new ones, a process that is going to create tension and problems (Fullan 2003). As these problems arise, people within the school must address them directly in order to ease the process toward the new structures. Therefore, change takes time and requires resources for implementation and vision; it does not happen from one day to another (Hall & Hord 2006).

The cornerstone for change is a common vision for everyone in the coalition to agree upon, so that they can fulfill it. Thus, the vision must be socially constructed so that teachers who support the first stages of change have a clear view and a common purpose as to where they are going to allocate their efforts (Dufour et al. 2008; Senge et al. 2012, Kotter 1996). Moreover, such a vision has to be shared with others in the organization, so that teachers who are not part of the coalition would know where the coalition wants to go and can be part of that vision in the future (Kotter, 1996). Some components of educational change also have to be flexible in order to accommodate the development of the new vision. Additionally, when new structures are set into place, a tension with the old structures can come to the surface. Teachers working in this new vision need to be able to utilize systemic thinking (Senge et al. 2012) so that they are able to understand their relationship to the school and the effect this change is going to have. Finally, teachers in the coalition need to be able to understand the detail and dynamic complexity of change within the school (Senge, 2010).

Once we understand how complex schools are, that change is a journey that cannot be traveled alone, and that school needs a common shared vision, the next step is implementation (Fullan, 2007). Here is where the cultural laws must be challenged. Schools may have norms and
assumptions, and expectations, and along with people’s beliefs about the school, those norms govern the existing decision-making process (Dufour & Fullan 2013). While implementation and cultural change take place, tensions will occur, and for a school to change its current practices into collective inquiry cycles (Dufour et al., 2010), it will inevitably challenge how teachers teach and how things are done. However, with a critical mass of teachers taking a leap of faith into a new way of teaching, enough momentum can be achieved and change can be anchored in the school’s new culture (Fullan, 2007; Kotter, 1996).

**Summary**

The purpose of this chapter was to review the relevant literature. PBL has been used in different fields for different purposes, which makes it clear how dynamic and malleable this methodology is, but it has never been used as catalyst for school change. By placing teachers through a simulation, we can study how that simulation changes their thinking and attitudes. Furthermore, PBL has embedded into its process key components that bring complex, even messy, situations to light, while at the same time it empowers teachers to solve issues in a safe environment. Finally, as the PBL core focuses on learning by doing, through that process students of PBL also become part of the solution.

The other purpose of this chapter was to review educational change theories and focus on those theories that foster a cultural change, not only changes to individual programs in a school. Understanding the complexity of change, the lessons, principles, and characteristics presented by the authors discussed inform and guide this study, which is built on the idea of systemic thinking, inquiry in classroom, work with peers, and focus on a common vision. The idea of change as a process and not an event is intended to nurture PBL’s final product and the learning process for teachers solving the Arboretum PBL.
CHAPTER 3
THE RESEARCH DESIGN

This chapter will address why this study provides a new reference to understand teacher participation in school change. First I offer a rationale for a case study methodology and its relevance as an approach to answer my research questions. Then I acknowledge the researcher’s bias and explain the lens through which this research is going to be interpreted. Afterwards, I outline the research design by describing the research questions, the purpose, the context of the study, and a rationale for the selection of this particular context. I also include the agenda for my data collection process, which describes different activities and outcomes, and explain how participants and teams were purposefully selected. Finally, I explain how I have to secured permission and followed IRB requirements for this type of study.

Methodology

Bogdan & Biklen (2006) defined methodology as “the general approach a researcher takes including both the data collection techniques and the theoretical assumptions they bring to the study” (p. 273), while Corbin & Strauss (2008) defined methodology as, “A way of thinking about and studying social phenomena” (p. 1). With these definitions in mind, the spectrum of possibilities expands to different approaches depending on the type of questions that a study encompasses.

Creswell (2013) argued that a quantitative method “involves the process of collecting, analyzing, interpreting, and writing the results of a study. Specific methods exist in both survey and experimental research that relate to identify a sample and population, specifying the type of design, collecting and analyzing data, collecting the results, making interpretations, and writing
the research in a manner consistent with a survey or experimental study” (p. xxiv). In addition, quantitative research also studies subjects in a controlled setting and creates data, and throughout the use and interpretation of such data, quantitative research is able to represent the social environment. Furthermore, such data is analyzed using a statistical framework, and it is through the use of statistical procedures that quantitative researchers are able to generalize findings from a sample of its population (Gall et al., 2002). Furthermore, “quantitative researchers tend to see the world in term of variables; they view explanation as a demonstration that there is a statistical relationship between different variables” (Maxwell, 2005, p. 29).

It is essential to understand that the question under consideration in a research study is going to determine what types of methods should be used to answer it. However, a decision about which method is better suited for a study cannot to be determined solely by what will be studied; there must also be a good match between the researcher’s personality, strengths, limitations, and skills to conduct such method (Merriam, 1998).

**The Research Questions**

There are several questions that must be taken into account when formulating one’s research. As discussed above, the type of research question defines the type of method that is most suitable to answer it. For instance, *how* and *why* questions are going to favor the use of case studies (Yin, 2013). On the other hand, as the researcher works through his or her research, experiences, and observation, the original question could be reshaped in accordance with new data (Dyson & Genishi, 2005).

**The guiding questions for this study are:**

How does PBL influence teachers’ perceptions of school change?

How does PBL help teachers establish a common vision for school change?
**Sub questions:**

1. What effect does participation in Problem Based Learning have on teachers’ perceptions of school change?
2. How does PBL affect teachers’ perception of collaboration with their peers?
3. How does PBL affect teachers’ perception of collaboration with school administrators?
4. How does teachers’ experience influence their decision-making processes?
5. How do teachers understand their role in school change?
6. How does participating in a PBL influence teachers’ readiness for participating in a Professional Learning community?

These questions focus on the usage of Problem Based Learning to influence teachers’ perceptions about school change. Most veteran teachers at the school under study were leaving the school within a period of nearly five years. The key knowledge of the organization was located within these teachers, and so knowledge that had been crafted over three decades could be lost. With that in mind, this study sought to investigate how an instructional methodology could be used to build a common vision for change. Hence the use of a PBL, which asks teachers to collaborate and solve problems when they are playing the main role in implementing change.

Different methodological approaches offer different data to answer these questions. An approach of a qualitative case study with descriptive statistics is imperative for different reasons. First, the PBL scenario describes a school culture, where knowledge belongs to teachers and not to the school. Thus, tension will be created in this scenario between the existing school culture and the new teachers who now are part of the school. In such a setting, can veteran and new teachers align their vision for school change? This study allowed me to “see the world in terms of people, situations, events and the processes that connect there; explanations are based on an analysis of how some situations and events influence others” (Maxwell, 2005, p. 29). My research questions focused on how to interpret the social world of the school, understand how it was
experienced, comprehend multi-layer social behaviors, and grasp the social world that was being studied; thus, a different approach was required. The second reason for using a PBL is that it described the complications involved in changing a school’s culture. In addition to the tools made available to teams, teachers would need to create structures, coalitions, and initiatives that would support their notions of managing change. The core of the study focused on how teachers were able to establish a common vision for school change, and the PBL was the vehicle through which their collective change strategies would or would not surface.

“Inquiry that is founded in the assumptions that individuals construct social reality in the form of meanings and interpretations, and that these constructions tend to be situational. The dominant methodology is designed to discover these meanings and interpretations by studying cases intensively in natural settings and by subjecting the resulting data to analytic induction.” (Gall et al., 2002, p. 634)

The third reason for the use of a PBL is that it requires a final product that focuses on school change. This research seeks to understand how decisions are made and actions are taken. I was immersed with the participants in the site, where things were happening, so much so that I started to care about and share participants’ perspectives. In this study the foci are on teachers’ behaviors, decisions, and actions in a simulation that occurs in teachers’ natural setting. Within this process, data were collected and theories were formed.

Krathwohl (2009) asked a relevant question: Can a phenomenon that is studied by its parts be studied as a whole? This study will not focus on only one variable, but on the change process itself and how it is embedded into the PBL. It would be almost impossible to describe a cultural change using a quantitative approach.

Case study

It is important to determine what type of research will best answer the questions in this study. Merriam (1998) argued that at the heart of the case study design is a deep understanding of
meaning for the participants, and this is the case for how participants are able to understand the situation in this PBL. Following a qualitative research methodology, the main aim of this study is to discover teachers’ perceptions of and reaction to the change process itself.

Yin (2013) explained that it is best to conduct a case study under three conditions or situations. The first condition is that research questions are constructed by a how or why, as are those presented in this study. The second condition is that the researcher has little or no control over behavioral events. The third condition is that the study focuses “on a contemporary phenomenon within a real-life context” (Yin, Kindle Locations, 2008, pp. 312-313). In this case study, each team that addressed the PBL was purposefully selected because they were the individuals who better informed the study (Krathwohl, 2009). Each team was autonomous in its decisions as to how to solve the PBL and how to run their own team, so the researcher had no control over their behaviors. Hence, the focus of this study was a current phenomenon. Finally, Hancock and Algozzine (2006) explained that case studies are an in-depth description of a unit or bounded system not only in space but also in time. The groups together constitute the boundaries for this case.

*The case: Teachers’ Perceptions of Arboretum, a Problem-Based Learning Activity*

The first step in case-study research consists of defining the case. It can focus on people, institutions or a program. This definition does not result from the researcher’s decision; it has a direct relationship with the research questions (Yin, 2013). Thus the research question: How does PBL help teachers establish a common vision for school change? And how does PBL influence teachers’ perceptions of school change? The first step, according to Yin (2013), was concerned with defining the unit of analysis. Teachers were part of a realistic simulation, in which they participated in addressing issues and solving problems in a safe, low-stakes environment. Teachers would solve the PBL in groups, but it would not be just any PBL; it would be one that resembled the school they were working in and that would give them a voice in current issues.
The unit of analysis for this case study is each teacher involved in solving the PBL. The next step was to determine the boundaries that would delineate which participants were part of the study from those outside. Time limits were also set up at the beginning and end of the case (Yin, 2013). For this case, the PBL bound the study, and only teachers solving the PBL at Grove School were part of the case.

**Participants and Group Selection**

The participants in this case study were teachers at Grove School. This was a purposeful selection, as Merriam (1998) suggested, which enabled me to find teachers that represented almost all teachers from Grove School. This selection allowed me to learn and investigate and gave insights from the participants’ perspectives when the teachers were placed into groups and those groups had to solve the PBL. I made decisions of how to compose groups according to different characteristics (Yin, 2013). The first characteristic was the number of years of experience within the school. The second characteristic was how close teachers were to their retirement. The third characteristic had to do with teachers’ experience. The fourth characteristic was whether or not the teachers were also content area leaders, which implied a power relationship with the other teachers and might have biased any group toward the content area leader’s ideas. The fifth characteristic was the grade that teachers taught. The goal was to have a pool of teachers who represented a whole-school perspective.

With these characteristics in mind, and with the experience of the second pilot study, five groups were selected, and each group consisted of five teachers. The first two groups encompassed veteran teachers who were also content area leaders. Two groups had these same characteristics because there were 12 content area leaders in the school⁴. The third group included novice teachers at school, who had been teaching at Grove School for three years or less.

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⁴ Math, Spanish, English, Science, Religion studies, Physical Education, Philosophy, IB, Arts, Social Science and IT.
The fourth team was a selection of teachers who had been teaching in the school for more than three years but were not content area leaders. The fifth group was made up of those teachers who taught in pre-school and therefore had a different culture within the school. They were usually homeroom teachers or oral skills teachers. They only taught in preschool, and they worked under two coordinators.

Finally, some key factors were taken into consideration for teachers who participated in groups three through five. The first one had to do with the teachers’ future in the school. As the PBL was looking forward to educational change, teachers who participated in this case study had to be teachers who were predicted to work at the school for at least 5 years. The second factor focused on teachers who were possible candidates to become future content area leaders. The third factor encompassed teachers who had shown excellent teaching skills, teamwork, and commitment to the school. To sort and select teachers, I gathered information from two persons working at the school—the principal’s assistant and the quality coordinator—both of whom had unique inside information about the teachers. The principal’s assistant was the gateway for any person at the school to access the principal, so that person knew who had direct access to the principal as well as the type of relations that existed among content area leaders and their teachers. As the assistant supported the principal in organizing meetings, she also reflected with the principal about how to set up the seating chart to have effective meetings. In addition, the assistant knew what content area leaders or teachers had differences types of power within Grove School. Likewise, the quality coordinator had a wide perspective on every teacher in the school, as Grove school has quality documents that have to do with grades, internal evaluations, document management, student records, and so on. In that process, the quality coordinator was able to see which teachers were organized, and this person also knew which teachers worked well together and which others were in a good disposition to support teachers who needed assistance.

This case study examined how PBL may influence teacher perceptions and a common vision for school change. The proposition underlying this study was that PBL would make an
impression on the participants of a holistic view of the school’s near future. The first step for this study was therefore to create the boundaries or limits to the study. In this case these were not the school per se, rather this study focused on a group of teachers from Grove School, solving Arboretum’s PBL.

The main reason for such mixed groups was to get multiple perspectives. As participants articulated solutions in the form of a plan for the future, their commitment to such an answer had a different level of relevance if some of those teachers had plans to leave the organization in the next one to three years. For participants of groups 1 and 2, some were facing retirement in the next 2-5 years, and three of those teachers had already fulfilled their requirements for retirement. Moreover, at least 80% of the possible participants for this study were enrolled in the second pilot study.

Tradition and Growth at Arboretum: A problem Based Learning for Educational Research

As explained in chapter one, the second pilot study, a PBL for Grove School, was developed for the purpose of this study. The pilot helped me to hone and refine the PBL scenario. In addition, as stated in Chapter 2, this PBL resembled the actual school where the study took place because of the similarities between the actual problem and the school.

With that in mind, the teachers at Grove School solved a PBL entitled, Tradition and Growth at Arboretum: A Problem Based Learning for Educational Research. The first part of the PBL at Arboretum addressed the logistics of the data collection. Participants had two and a half days to engage in the problem-solving process. The PBL was solved in the school’s auditorium. This location had two characteristics that supported my observations and the team’s work. The first was space. Each team had enough space to work without bothering other teams. The second was isolation. The study took place in the auditorium on the fourth floor of the building, and there
was nothing else on that floor. On the first day the auditorium was set up in groups. Each team had a set of seats, paper, pens, a table, and power outlets ready.

This second part focused on data collection during the PBL. For these two and a half days, the main instruments for data collection were observations—reflective journals and two surveys. During the pilot studies, this was the space in which teachers had to solve the PBL, but participants took their work home and it was almost impossible to see the process as a whole. To avoid this situation, an agenda was set up within the scenario. The idea was guide each team on how they needed to use their time. In addition to the agenda, each team had to deliver part of the final project each day. The agenda is explained in Table 1.

Table 1 Activity Chart

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>00:00</td>
<td>Pre reading</td>
<td>Each participant is going to read the PBL Arboretum before the workshop begins.</td>
</tr>
<tr>
<td>1</td>
<td>8:30</td>
<td>Welcome</td>
<td>Hiding numbers THINK OUT OF THE BOX TO SOLVE PROBLEMS.</td>
</tr>
</tbody>
</table>
| 1   | 8:45  | Team work                 | • Each team is going to set up its ground rules, and specify how decisions are going to be made.  
|     |       |                           | • Each team is going to assign a member who is going to keep records of team’s decisions.  
|     |       |                           | • A group history                                                            |
| 1   | 9:30  | PBL Review                | Teams are going to analyze the PBL scenario and write a list of clarifying questions about the PBL. |
| 1   | 10:30 | Break                     |                                                                             |
| 1   | 11:00 | Questions and answers     | • Teams are going to get together and try to answer any question they have about the PBL within the team. If it is not possible, I will assist them.  
|     |       | Arboretum Issues          | • Meanwhile each team is going to state out Arboretum issues.                |
| 1   | 1:00  | Lunch                     |                                                                             |
| 1   | 2:00  | Issues                    | Teams are going to prioritize each issue. Teams must state which issues they are going to address with their final product and why the other ones will be left behind.  
<p>|     |       |                           | Teams work on the plan or solutions.                                         |
| 1   | 3:15  | Closing activity          | Participants are going to state what they liked about the day’s work and what they did not like. The focus on this answer goes toward the work the team did. |</p>
<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30</td>
<td>Ice breaker -- Radio controlled cars.</td>
<td>Using model cars, each team races, one at a time. The racing team presents the team ground rules. There will be one driver per team. The driver sits with his or her back to the track. Other members guide the driver. Other teachers take notes on the team’s behavior to determine whether they are following their rules. Each team reflects on the following: Were your team rules applied for this activity? Is there any change that you want to make in the rules? Were the rules okay, but the team did not follow them?</td>
</tr>
<tr>
<td>9:30</td>
<td>Issues</td>
<td>Teams work on the issues and solutions</td>
</tr>
<tr>
<td>10:30</td>
<td>Issues</td>
<td>Teams finish their answer to each issue they are going to address. And prepare to present their ideas to the entire group.</td>
</tr>
<tr>
<td>11:00</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>11:15</td>
<td>Presentation</td>
<td>Teams finish their answer to each issue that they are going to address and work on their presentation.</td>
</tr>
<tr>
<td>1:00</td>
<td>Lunch</td>
<td></td>
</tr>
<tr>
<td>1:45</td>
<td>Presentation</td>
<td>Teams finish their 15-minute presentation.</td>
</tr>
<tr>
<td>2:45</td>
<td>Presentation</td>
<td>There will be a demo of the presentation and ground rules for the final presentation.</td>
</tr>
<tr>
<td>3:15</td>
<td>Bus stop</td>
<td>PLC characteristics… and Change characteristics</td>
</tr>
<tr>
<td>8:30</td>
<td>Final Preparations</td>
<td>Review final preparation.</td>
</tr>
<tr>
<td>9:00</td>
<td>Presentations to an expert panel</td>
<td>15-minute presentations. Teams must write the similarities and differences on how the issues were solved.</td>
</tr>
<tr>
<td>11:00</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>11:30</td>
<td>The end</td>
<td>Workshop evaluation, dates for final report and dates for interviews.</td>
</tr>
</tbody>
</table>

This structured agenda allowed me to follow participants’ work during each day. In addition, it provided time for the teams to collaborate efficiently while they solved the PBL. From both pilot studies, I learned that is hard to observe the teams actually solving the PBL. In the pilots, much of the work was done outside of the time allocated for the PBL. The idea for this agenda was to get participants to work during the day and to make their work visible. The
participants had time to reflect on what happened each evening, but they made their thoughts transparent when their groups reconvened to work out their solutions.

Methods

Different methods were used for this study: field notes and participant observations, interviews, two surveys, and document analysis. Each method allowed me to find data pertinent to answer the research questions.

Field Notes and Participant Observation

In participant observations there were some key factors that needed to be addressed. The first issue was that teachers were aware of my presence during these observations, and as Krathwohl (2009) pointed out, participants can adopt behaviors that are more likely to be approved by peers and the observer. With that in mind, my presence did not affect their participation because this was going to be the 5th time I was working with the teachers in this kind of seminar. What was different for me was that this seminar constituted my data collection process, and teachers were informed of this special characteristic when they were selected to participate.

Because of this, field notes including observations of the participants were written out. There were two spaces for field notes to be completed. The first type of notes came from what was observed and offered evidence to inform the study. The second type of notes included my daily reflections. As Bogdan and Biklen (2006) pointed out, this type of field notes provides rich descriptions of the activities, events, and especially conversations that took place during the PBL activity. Furthermore, this second type of field notes focused on the inquiry and how observations were related to the inquiry presented in this study.
Documents

For this study, a set of documents provided meaningful material to answer the inquiries stated in the research questions. Because the PBL required a final product and a presentation, I was able to review these documents. The groups’ presentations were 15-minutes with a power point, prezi, or any type of digital aid that participants used to present their solution to the PBL Arboretum. As a researcher, I had access to those presentations, and in addition I observed the final presentation that teams did for school leaders. As all this was part of the PBL activity, permission was already secure.

The final product as presented in the PBL Arboretum required each team to present a 5-year action plan. In addition, it required a definition of the problem, how to address such a problem with specific activities, and how to gain support from Arboretum key actors to overcome obstacles. There could be more than one problem that each team found in Arboretum for that team’s five-year plan to address.

Interviews

At this point, it is clear that interviews were required for this process, as they would provide a deep understanding of how PBL affects teachers’ perceptions about school change. Participants were selected randomly for the interview, which was informed by the workshop and observations that were done. With this in mind, the interview was intended to understand teachers’ perceptions and how they had been affected by the PBL experience. At the end, the question was are teachers going to change? Meaningful school change only happens when teachers change. The way to understand the extent to which teachers have changed is to do in-depth interviews, because “at the root of in-depth interviewing is an interest in understanding the lived experience of other people and the meaning they make of that experience” (Seidman, 2012).

To select teachers for interviews, a probability sampling (Merrian, 1998) was done and teachers were randomly selected, with one from each team. Five pieces of paper, numbered from
1 to 5, were introduced in a glass. Each team had a glass with five numbers, and each member drew one piece of paper. When all participants had their piece of paper, I asked one teacher to pick a number from one to five, the teacher said three, and so I had selected my five interviewees. Appendix A includes the guiding questions for the interviews. All participants answered the same questions. This was a semi-structured interview, as I always asked all the questions but also added more questions depending on the answers provided by the interviewee.

As teachers were randomly selected for the interviews, those interviewees were a representative sample of participants solving the PBL. On the other hand, there were some specific participants I wanted to interview who may have been key informants for the study. For example, I knew one participant usually offered radical ideas for his team, but not all of those ideas came through in the team.

**Surveys**

During two points in the process, short surveys were distributed to participants. Both surveys were constructed using a Likert format. The second survey had seven questions that were asked in the first one, so I could see how participants’ answers changed. Besides, the second survey also had a space where participants could make any type of comments for each question. Survey items directly related to the research questions, and responses were anonymous. These surveys are included in Appendices 2 and 3.

**Methods Matrix**

A methods matrix is a visual representation of the relationship between research questions and data sources. On the left side of the matrix, the research questions appear, and on the right side there are the three data sources. An “FNO” stands for Field Notes and Participant Observations. “Docs” means those documents that were analyzed. Finally, the “X” is the data
source for each question. For example the question, “How can novice teachers challenge school’s current culture and foster change?” was answered using all three data sources.

Table 2 Methods Matrix

<table>
<thead>
<tr>
<th>Research Questions</th>
<th>Present</th>
<th>Docs</th>
<th>Interviews</th>
<th>Surveys</th>
</tr>
</thead>
<tbody>
<tr>
<td>How does PBL influence teachers’ perceptions of school change?</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>How does PBL help teachers establish a common vision for school change?</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>What effect does participation in Problem Based Learning have on teachers’ perceptions of school change?</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>How does teachers’ experience influence their decision-making processes?</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>How do teachers understand their role in school change?</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>How does participating in a PBL influence their readiness level for participating in a Professional Learning community?</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Data Analysis

There were four sources of data for this study: field notes and participant observations, documents, interviews, and surveys. For each source, I next describe the process that I followed to do my data collection and analysis.

Field Notes and Participant Observation

Field notes were taken at the end of each day. Such notes also included reflections and comments that I heard from the participants in any step of the process. There was reflection on the process in which I found a free space to follow my hunches, discuss what went well, and explore the downtime during the process. All field notes were coded under the same system as the interviews. This process is explained in the interview’s data analysis.
Document Analysis

There were two types of documents. Both documents were analyzed as a set: final presentation and final product. As teams delivered the final paper one week after the seminar was done, new ideas and issues or different rankings were given to the issues. Documents were also numbered and coded, but the main issues that were compared among the five groups allowed me to find out both the common ground and differences among teams. This comparison was done in a Microsoft Excel file that had five numbered columns. The first had the team’s number; the second had the document type, final product or presentation and the number line; the third had the code; and the last had the text that was coded.

Interview Analysis

For the purpose of this study, each interview was audio recorded and transcribed. For the analysis, each transcription had a line number in Microsoft Word and was coded. The coding process had six steps. The first step started with the first interview. Codes emerged from the transcripts and were highlighted. The second step was the code organization, which was outlined in a Microsoft Excel file with the following columns: Code, citation of the interview, line, and interviewee. Each code was then sorted. There were no preconceived codes for these first steps, but as the interview coding evolved, codes did transform. The third step was to code all interviews. The fourth step was to review the list of codes, and look for those that offered evidence that supported the answers to the questions presented in this study. The fifth step was a depuration of the codes, and a final list of the codes was selected upon their frequency. Again, all codes that informed the study were taken into consideration for analysis. The sixth step was to review all interviews with the final list of codes to avoid losing vital data for this study. The final result of these six steps was a Microsoft Excel file with a list of codes, with their fragments from interviews, a line number, and a reference to the interview in which that fragment belonged. As the coding process began, new codes could emerge from any interview, and in that process prior
coded data would be recoded again. During the process of recoding, triangulation of the data and findings could become reliable. In addition, if it is required, data could be audited by two participants who would be randomly selected.

**Survey**

Items were constructed using a Likert format. The scale used was from 1 to 5, where participants only marked one answer. In addition, both surveys were paper-based instruments. Data was transcribed to Microsoft Excel, and frequencies, median, modes, standard deviation, and media were calculated for each question. In addition, comments from the second survey were transcribed and coded as the interviews.

Surveys were administered twice during the seminar workshop. Each survey was paper-based, and the results were translated from Spanish to English. Each participant in the study completed both surveys. Survey comments were coded and transcribed using Excel, and descriptive statistics were used to analyze the results. The data analysis was also done in Excel, calculating measures of central tendency such as the N, mode, median, mean, and standard deviation.

Six questions from the first survey were also asked in the second survey. The purpose was to examine if there were any changes in the participants’ experiences and perceptions while solving the PBL. The third day of work was short, and participants focused their energy on their presentation, so I did not give them a third survey to answer. There may have been an advantage of a third survey, but I was concerned that participants would answer it hastily in a rush to be done with the work.

**Study Purpose**

This study, as it was intended, created a setting where the researcher was able to understand how teachers perceive their participation in school change. A unique feature of the
study was the use of a PBL that simulated the current school situation and presented an understanding of the school’s culture. This PBL offered a unique and secure setting for participants to step back from their daily/monthly work and question other teachers about their knowledge, and how that knowledge lived only within teachers and could leave the school in the immediate future.

As the school’s culture in Arboretum PBL did not foster a method of knowledge sharing, a cultural change was required. One question needed to be addressed in order to focus the PBL: Is it good enough to encourage teachers on a journey of cultural change within the school? One ingredient in the PBL was that teachers create solutions that may be applied to Grove School. Therefore, solutions were not coming down from the board, principal, or administration, but rather from five teams of teachers who articulated solutions for these issues. This approach assured easier implementation of such solutions in the school because a coalition of teachers could be created, and there might be enough of a critical mass to start an educational change. For these reasons, this study offers a unique opportunity to look inside a school and study teachers as the central factor for school change.

When would be the best timeline to schedule the three-day PBL seminar and conduct the participant interviews in the two-week period afterward? In order to accomplish this, the IRB process had to be done, which took no longer than a week and a half. A Penn State Grad student also reviewed the IRB forms to assure the IRB that the letters were identical in both languages.

**Assessing the Study**

As part of the methodology, two issues came to light: namely, the validity and reliability of the study.
Validity

Krathwohl (2009) refers to validity as “the basic data from which descriptions, explanations, or theory are derived are of sufficient quality” (p. 346). Likewise, Maxwell (2013) refers to validity as the relationship between conclusions and reality. Different strategies were set into place to protect the study from invalidity. Triangulation was used among the different methods for data collection, and data was consistent from the surveys, interviews, and final product-presentation. Also, active search for discrepancies in the data was done in the coding and recoding process. Finally, two participants did a member checking, reviewing data and interpretations. I shared with those participants what I had written. Those participants were purposefully selected because my findings were written in English and not all the teachers knew this language.

Validity Threats

There are two types of validity threats, and those are Researcher Bias and Reactivity (Maxwell, 2013). The issue with validity threats is that they may lead the research to invalid conclusions. The Researcher Bias focused on “how a particular researcher’s values and expectations may have influenced the conduct and conclusion of the study” (p. 124). Reactivity looks at how the researcher/observer alters the behavior of participants in their natural setting (Maxwell, 2013). The goal is to acknowledge the researcher effect and use it to the benefit of the study. There are different strategies that may increase credibility of my conclusions.

Rich Data

Interviews offered rich, in-depth data for this study. Interviewees were randomly selected among each team. All interviews were audio recorded and transcribed. Anonymous surveys also presented thick data for this study. In addition, they allowed a comparison when seven questions were incorporated in both surveys in different order. Furthermore, survey comments gave participants the option of writing their thoughts in each questions of the second survey. Final
products and presentations offered a clear document that participants were able to produce over the period of three days. Such documents added a key component of rich data for this study.

**Respondent Validation**

This was a member check, as two participants were purposefully selected to provide this feedback to my data and conclusions. Some factors did not allow me to do a random selection to do the member check. As this document was in English, not all participants were able to read comprehensibly in this language. On the other hand, as the participants were teachers, they had a week of celebrations for Grove School’s 70th anniversary that interrupted the validation. Two teachers who belonged to different teams were able to give me feedback on my data and conclusions. They agreed that all data presented was consistent with their views of the PBL experience.

**Searching for Discrepant Evidence**

The process of coding interviews and final products – presentations and surveys – allowed me to find if there was any discrepancy from any data source that I used. Observations and field notes also provided a frame to evaluate any data and conclusions. Three main issues appeared on the data. The first was a comment that one participant gave me two weeks after the PBL took place. The participant said: “my ideas were not always well accepted as other ideas from different team members… but at least one of my ideas was part of the solution to the issues that we found” (Participant).

Interviewee 1 reported some discomfort with the interviewer (me), but he/she also added:

Interviewee 1 - “It's a little uncomfortable answering these questions.”

Interviewer - “Why?”
Interviewee 1 - “For interviewer characteristics. Although [I] arrived thinking, well I am very pleased with academics then it seems to me that when I work on academics, [I] respect what [others] are doing but still, there is a mindset of who that person [(interviewer)] is and who I am and where we are and what [if] I say suddenly [something that] is not right, then it generates a little of... [but that did] not bias my answers.”

Although the interviewee expressed some reservations, she/he ended the statement by affirming that the interviewer did not provoke any bias in her/his answers.

Triangulation

I used different methods to collect information from an array of participants. Forty-six surveys, five interviews, five final products and presentations, and a Word file with my notes were analyzed. As triangulation by itself is not automatic, bias could be found in all methods of data collection (Maxwell, 2013).

Reliability

Reliability in qualitative studies refers to the “fit between what [the researcher] records as data and what actually occurs in the setting under study” (Bogdan & Biklen, 2006, p. 40). One approach to find reliability in any study is the use of triangulation (Krathwohl, 2009). Data from this study have different sources; triangulation between the surveys, the interviews and the final products with the presentations allowed me to find the fit between what happened in the data collections and my findings. Likewise, the process of coding and recoding reinforced the reliability of the study. Finally, the use of a “clear audit trail” (p. 346) in the Excel file allowed me to track any data that was presented in the study.
My role at Grove School

For this first year at Grove school, I had been learning about the business side of the school. This means I had been working with budgeting, infrastructure, and other business projects. I did not work with teachers’ evaluation, I had only been invited to the academic council, where I shared ideas and we reflected upon educational issues. Only content area leaders were members of this council. My relationships with some teachers started long before I worked at the school, and many of them have become close friends. The advantage of this role during my first year was becoming an insider, so I had knowledge about the school and the participants. Also, I had access to key informants, which allowed me to structure teams.

The PBL Arboretum did not lead participants to any particular conclusion. The reasons for this are in the learning acquired after conducting two pilot studies. Likewise, my view of the participants and the school as an insider allowed me to craft a “swampy” and realistic simulation. As a final point in my role at the school, I am recognized as an important person at Grove School. However, the PBL was well designed and administered, and I would argue that the better the scenario is, the more engaged teachers become, and the less participants let outside factors such as my role influence their contributions and ideas.

Summary

The purpose of this chapter was to outline the relationship between the research questions and the methodology that assured the most convenient approach to answer them. In addition, this chapter explained how the methodology relates to the research questions. As this was a case study, this chapter defined the boundaries and how teams participating in the PBL seminar became the unit of analysis. A key component of this chapter was the relationship between the research questions and the method used to collect data in an effort to answer the inquiries stated. Furthermore, this chapter explained how the data was analyzed, and how a rich description from the participants’ perspective was required to be able to find answers to this particular case study.
CHAPTER 4
RESEARCH FINDINGS

Introduction

This chapter presents data drawn from two surveys, five interviews, and five reports generated by each team. In addition, I explain how data were collected and analyzed for each of the three data sources.

To find answers to the primary research questions, I conducted a case study using Arboretum as an experience through which I sought to understand teachers’ perceptions of school change. This methodology allowed me to see how the PBL Arboretum influenced teachers’ perceptions about school change and if they were able, as a team, to build a common vision for school change. Further, the PBL allowed me to study teachers in their own school. Finally, the research and data collection process focused on getting the participants’ perspectives on their experience with the PBL. As this was a case study, I defined the unit of analysis as those teachers solving the PBL; this is why all the data collection devices focused on teachers. Also, this case study was bounded by the PBL; only those teachers solving the PLB were part of the study.

This study took place in Grove School, Bogota, Colombia. For this study, the school allocated in the auditorium on the fourth floor of the International Baccalaureate building. This setting allowed participants to center their attention on solving the PBL because it was an isolated place within the school’s facilities with nothing else on that floor or above. The location allowed teachers to work without interruption, as no students, administrators, or other teachers came to the fourth floor. The room had natural daylight from all corners, and the IB building was the tallest on campus, so no other building blocked the light. The room was 56 by 50 feet, and five tables with six chairs each were placed in a U shape. Each team had a paperboard and markers to use as needed. Snacks were also provided, and participants only had to leave for the afternoon meal.
The time frame to solve the PBL Arboretum was two and a half days. Grove School provided two days of leave in order for participants and teachers to work on the PBL, and teachers also worked a half-day on Saturday. The first day, teachers had regular classes, so they found replacement teachers among the faculty. The second day, Grove School had special activities for all students, so participants did not have any school duty for that day.

Each research question was addressed by data from at least three different sources to achieve triangulation. Participants were asked to solve anonymous surveys and produce a final product that addressed issues from the PBL, and five participants were randomly selected (one from each group) for interviews. There was no contradiction in the data from any sources, as all sources had similar themes and patterns. At the end of this chapter, findings for this study are supported based on data arising from these different sources.

**Data Collection Devices**

All data analysis was done using open coding. I gave names to and categorized different portions of my data with a detailed examination (Strauss & Corbin, 1990). Interviews, final products, presentations, and survey 2 comments were coded using words and phrases that represented the essence of fragments of the data (Saldaña, 2009). The codes had a direct relation to the questions that guided this research. As I was searching for data that would support answers to the questions, each fragment of data that allowed me to answer questions was given a code. As data that offered new insights was coded, different codes emerged (Merriam & Associates, 2002), which prompted me to look back on all the already-coded data to verify if any information could be recoded. This process allowed me to recode data over and over again for greater accuracy.

**Field Notes**

I was able to understand how rules allowed teams to collaborate efficiently. Rules gave teams tools to build on peers’ ideas, to listen to other views and different approaches. On the
other hand, as I tried to lower my interactions with each team, observations became harder. I reflected on how I saw the teams working and their engagement in solving the PBL.

Survey Results

Surveys were administered twice during the course of the PBL experience. This first survey was administered at the beginning of the second day of group problem solving. Twenty-four participants responded to the first survey. One participant had an accident early in the morning of this second day and was incapacitated for 10 days, so she could not participate in the PBL. The second survey was administered at the end of the second day. Participants completed the second survey overnight and returned it on the third day. Out of the 24, 23 surveys were completed and returned.

Table 3 Teachers’ Perceptions of the Influence of Problem Based Learning

<table>
<thead>
<tr>
<th>Item</th>
<th>Question</th>
<th>Survey</th>
<th>Median</th>
<th>Mean</th>
<th>Mode</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>to what extent did you find the PBL scenario realistic?</td>
<td>S1</td>
<td>5</td>
<td>4.92</td>
<td>5</td>
<td>0.28</td>
</tr>
<tr>
<td>2</td>
<td>To what extent has participating in the PBL influenced your thinking about school change?</td>
<td>S1</td>
<td>4</td>
<td>3.54</td>
<td>4</td>
<td>1.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S2</td>
<td>4</td>
<td>3.91</td>
<td>4</td>
<td>0.75</td>
</tr>
<tr>
<td>3</td>
<td>To what extent did working on the PBL affect your perceptions of collaborating with others?</td>
<td>S1</td>
<td>3</td>
<td>3.46</td>
<td>3</td>
<td>1.02</td>
</tr>
<tr>
<td>4</td>
<td>To what extent did the PBL alter your perceptions of teachers’ roles in change?</td>
<td>S1</td>
<td>3</td>
<td>3.42</td>
<td>3</td>
<td>0.97</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S2</td>
<td>3</td>
<td>3.23</td>
<td>3</td>
<td>0.97</td>
</tr>
<tr>
<td>5</td>
<td>To what extent did you feel free to respond to the PBL honestly and</td>
<td>S1</td>
<td>5</td>
<td>4.38</td>
<td>5</td>
<td>0.82</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S2</td>
<td>5</td>
<td>4.32</td>
<td>5</td>
<td>0.99</td>
</tr>
<tr>
<td></td>
<td>To what extent did working on the PBL enable your group to build a common vision for school change?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------------------------------------------------------------------------</td>
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<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>S1</td>
<td>4</td>
<td>4.13</td>
<td>5</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S2</td>
<td>4</td>
<td>4.32</td>
<td>5</td>
<td>0.72</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To what extent did the PBL experience influence your decision making process?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>S1</td>
<td>3</td>
<td>3.04</td>
<td>3</td>
<td>0.91</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S2</td>
<td>4</td>
<td>3.62</td>
<td>4</td>
<td>1.02</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To what extent PBL helped you work on deep listening.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>S1</td>
<td>4</td>
<td>4.17</td>
<td>4</td>
<td>0.76</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To what extent PBL helped you build on your peers ideas.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>S1</td>
<td>4</td>
<td>4.17</td>
<td>4</td>
<td>0.70</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To what extent surprising ideas emerge in your discussion.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>S1</td>
<td>3</td>
<td>3.50</td>
<td>3</td>
<td>1.10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S2</td>
<td>4</td>
<td>4.00</td>
<td>4</td>
<td>0.98</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To what extent do you believe a PBL experience would benefit all teachers?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>S2</td>
<td>5</td>
<td>4.55</td>
<td>5</td>
<td>0.60</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To what extent did you feel the dynamics in your group led to the best possible decisions?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>S2</td>
<td>5</td>
<td>4.50</td>
<td>5</td>
<td>0.67</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To what extent did you feel the relationships in your group change over time?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>S2</td>
<td>4</td>
<td>3.82</td>
<td>4</td>
<td>1.18</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To what extent did you feel better prepared for school change due to working with this PBL?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>S2</td>
<td>4</td>
<td>4.14</td>
<td>5</td>
<td>0.94</td>
<td></td>
</tr>
</tbody>
</table>

For item number one, participants were asked: To what extent did you find the PBL scenario realistic? The mean response was 4.92, and the median was 5 with a Standard Deviation (SD) of 0.28, indicating that participants found the scenario to be very realistic. Measures of
central tendency indicated a low dispersion. Interviewee 4 remarked how the PBL seemed a lot like something he had already lived, and it wasn’t far from his own school’s reality. Furthermore, interviewee 4 stated how Arboretum was similar to Grove School.

On the second item, participants were asked: To what extent has participating in the PBL influenced your thinking about school change? Medians and modes for both answers in the first and second surveys were 4. Participants reported that PBL actually influenced their thinking about school change. The only difference was in the means. For the first survey, the mean was 3.54, and for the second it was 3.91, showing that the participants were more influenced to think about school change when participating in the PBL from day one to day two.

Comments from the survey reflected that PBL did influence the participants’ thinking about school change. One participant wrote, “change can be generated,” (survey 2), and another participant reflected in his/her writing “having and sharing ideas helps [me] to improve, get another perspective of positive change” (survey 2). Also, new ideas that one participant had not thought about came to light, “I found ideas or aspects that I had not thought” (survey 2).

Interviewee 1 related that before the PBL he/she had thought that “change came from outside of the institution,” but once this participant realized and addressed the issues presented in the PBL with the team, he/she stated that “we are the ones that recognize the school’s reality... it should come less [talking about school change] from outside and more from the inside” (survey 2).

Interviewee 3 quoted the PBL, referring to one teacher who argued, “things are going well why should we change?” But when this participant reflected about change, he/she said, “there always is going to be an horizon in which we can expand” (survey 2).

In item number three, participants were asked: To what extent did working on the PBL affect your perceptions of collaborating with others? The mode and median responses were 3, and the mean was 3.46, indicating that participants thought that PBL affected their perception of collaboration to some degree. On the other hand, the interviewees referred to collaboration over
and over again. Interviewee 4 argued that his/her team was made up of peers whom worked together constantly in their daily work at the school. Thanks to the PBL, this teacher was surprised that:

“We had worked so harmoniously that we had understood so well that [all] times, [when] we were not in agreement, we [were able to reach] consensus quickly and I think the most important thing was that we could think through the exercise [that] we did. We reflect[ed] on our own academic activity” (survey 2).

Finally, this interviewee reflected that with the team, the participants “could think through the exercise that we did, we were able to reflect on our own academic activity” (survey 2).

The fourth item asked: To what extent did the PBL alter your perceptions of teachers’ roles in change? Modes and medians were 3 and 3; while means were 3.42 and 3.23; which implied that measurements of central tendency remained consistent in the second administration of the survey. In the second survey, a participant wrote, “with this experience, I believe that there are many contribution[s] that we can offer and may generate worthy changes”. On the other hand, one teacher reflected that, “there has always been aware[ness] of teachers’ role in change but there has been little action” (survey 2).

Another participant reflected upon the team and said “maybe in my group I keep thinking that some persons prefer to die instead of change” (survey 2). On the other hand, interviewee 4 offered a different perspective, in which PBL did alter her/his perceptions of teachers’ roles in change, saying, “actually I work in the PBL and the proposal that emerged… we realized that teachers are more important than I thought, teachers can create change and can generate changes not only [to] help them in class but all the institution” (survey 2). This realization came at the end of the PBL, when all the pieces of the team’s final product came together. Likewise, participant 1 explained how the teacher’s role changed from that of a
professional who has to fulfill employer requirements to a role that focuses on “building knowledge” (survey 2).

The fifth item asked: To what extent did you feel free to respond to the PBL honestly and candidly? Modes and medians for both surveys were 5 and 5, and means were 4.38 and 4.32, which implies that the data are negatively skewed, as the mean median and mode are almost at the same point. In addition, the standard deviations were 0.82 and 0.99, which means that the answers to the questions have a low dispersion. This question had almost no variation between the first and the second interview. Modes, median, and means so close together in the fifth interval indicate that participants felt free to respond the PBL honestly and candidly. On the comments for the second interview, participants commented that they felt “free,” “the atmosphere created offered this possibility,” and that “the space was open and trustful” (survey 2). On the other hand, interviewee 1 reported on the comments that it was “It's a little uncomfortable answering these questions... because of the characteristics of the interviewer... but I think it didn’t bias [me] when answering my questions” (survey 2).

On the sixth item, participants answered the question: To what extent did working on the PBL enable your group to build a common vision for school change? Modes for both surveys were 5, medians were 4, and means were 4.13 and 4.32. With modes in the highest interval and medians and means in the second highest interval, a negative skewed distribution and increase in the second survey of answers in the last two intervals, the PBL enabled participants to build a common vision. In addition, the standard deviations were 0.90 and 0.72. This means that the answers to these questions had a low dispersion that became lower in the second survey. Participants reported in the second survey for this item comments such as, “Significantly, align in a common front and fuse the various proposals into one” (survey 2). A second participant wrote: “Aligning the same professional search” (survey 2). A third participant stated: “We find common ideas for the same purpose” (survey 2). Interviewee 4 also stated that the team was able to build a common vision for school change, saying, “We achieved the maximum. We all agreed that indeed
those points on which we agreed were necessary, were fundamental and perhaps they were urgent” (survey 2). Likewise, interviewee 3 also assured the interviewer that the team was able to find a common vision for school change: “We all agreed, first understanding of each other’s ideas and the way in which activities were developed was so smooth I think if it was a common vision.”

Participants in this PBL found ways to work in their teams. Such a process was guided by the teams’ own rules. Teachers were able to collaborate within their teams, listen, build on peers’ ideas, and see issues from different perspectives. This collaboration allowed teams to find a common vision to solve the PBL Arboretum, which implies the potential for school change.

In the seventh item, participants addressed the question: To what extent did the PBL experience influence your group’s decision-making process? The mode and median increased from 3 to 4, and the mean also increased from 3.04 to 3.62. These answers showed teachers’ perceptions of how the PBL experience actually influenced the group experience in decision-making. The data reflected a change from a symmetric distribution towards a negative skewed one, so participants agreed that the PBL influenced their group decision-making while they experienced the PBL. Furthermore, from day one to the second day, participants stated that the PBL influenced their decision-making process. Likewise, Interviewee 2 reflected that the PBL “methodology actually influenced me, it allows the construction in a cooperative and collaborative way towards problem solving”, collective decision-making, group dynamics, and “team work allows participants to analyze issues from different perspectives” (survey 2). Another participant wrote, “I found new tools that will aid me in decision making” (survey 2). From different angles, PBL Arboretum influenced the group’s decision-making process, and as teachers moved forward in the process they agreed more with this statement.

The eighth item teachers had to answer was: To what extent has PBL helped you work on deep listening? The mode and median were 4, and the mean was 4.17, which implied that this was a symmetrical distribution, where the mean median and mode were almost at the same point. In
addition, the standard deviation was 0.76. This means that 68.26% of the data were in the interval of the mean, plus (4.93) or minus (3.41) one standard deviation. As a conclusion for these measurements of central tendency, participants believed that the PBL Arboretum helped them work on deep listening. Interviewee 1 also referred to the team’s work. In the interview, this teacher reflected on his/her role and how listening is a key component:

“...Put on the table the arguments you have, the things you think, listening to other's experience and understand that despite being in different places and having different experiences within the school, the feelings are common, there are things we agree with most of the time” (survey 2).

As teachers were able to engage in deep listening with their peers, they were able to understand different perspectives, open their minds for surprising ideas, and collaborate toward the purpose of building a common vision for school change. The PBL Arboretum gave participants time to listen to each other and to grasp other's positions and build upon those different positions. Also, rules allowed team to make decisions towards a solution and consensus, while in some cases a vote was the path followed.

For item number 9, participants reflected on the following question: To what extent did the PBL help you build on your peers’ ideas? Data reported that both the mode and median were 4, and the mean was 4.17. In addition, the standard deviation was 0.70. That implies that 91% of the participants were able, to a great extent, to build in their peers’ ideas. Even so, participant 2 offered a perspective of how listening added value to the teams interactions and how it became part of a future that allowed the team to find solutions, “as we all listen and reach consensus, to listen to others leads you to others’ ideas” (survey 2). Thus, this participant was able, through listening, to build on his/her peers’ ideas.

For item number 10, participants were asked to answer: To what extent do surprising ideas emerge in your discussion? The mode and mean for the first survey were 3, while for the second they were 4. Also, there was a change in the median from 3.5 to 4 in the second survey. In
addition, the standard deviation was reduced from 1.10 to 0.94. Over the work done in the second day, it was clear that participants felt that surprising ideas emerged in their discussions. The answer to this question had a negatively skewed distribution, with a lower standard deviation, meaning that data was less dispersed. On the second survey, in the comments section, one teacher wrote that surprising ideas emerged in “leadership, planning and capacity for change” (survey 2), and another teacher made comments related to surprising ideas “from past experience, realistic, achievable ideas” (survey 2). As a conclusion for this item, surprising ideas did emerge in group discussions.

For item number 11, teachers had to answer the following question: To what extent do you believe a PBL experience would benefit all teachers? The mode and median were 5, and the mean was 4.55. In addition the standard deviation was 0.6, which means that the answers to the questions had a low dispersion. That explains why 95% of the participants agreed that a PBL experience would benefit all teachers. Comments for this question on the second survey focused on a voice for teachers, saying, “this proposal opens inclusive participation. It is for development of the entire community” (survey 2). Comments also focused on the benefits for the school and its community, saying that PBL Arboretum, “improves teamwork, the ability of analysis and reflection, as well as establishing strategies for planning and leadership” (survey 2).

Interviewee 4’s comments illustrated how this PBL would benefit all teachers in the institution, following what participants answered in the second survey:

“... It is that we [were] 25 [teachers] and we work here [solving the PBL Arboretum] and the other 125 [teachers are not here] nope, [they are] never going to find out what happened here, when training is done or when the same institutional planning is trying to do this kind of exercises that are more mental than in some cases are the best, because it puts one to think and connect neurons, could be very enriching because consciously one says to me that no, so I went in one ear and out the other, that does not it is true, one in
Participants found that PBL Arboretum benefited all participants, as it was a space where they had time to work on collaboration skills, planning, and finding or reinforcing their leadership roles. In addition, it was an inclusive experience. Again, participants found in collaboration a way to create or, even better, to co-create solutions to issues found in Arboretum educational issues that demanded an educational change in one direction or a common vision. The critique from one interview was that this experience was reserved for a few members and that the remaining of the faculty was not going have access to this opportunity to reevaluate their ideas about school change, build a common vision, or consider teachers’ role in school change.

For item 12, participants were asked: To what extent did you feel the dynamics in your group led to the best possible decisions? The mode and median were 5, and the mean was 4.50. In addition, the standard deviation was 0.67, which means that the answers to this question have a low dispersion. Further, the higher frequency is in the 5th interval, proving that participants felt that dynamics in the group led to the best possible solution.

One characteristic for groups to achieve the best possible solutions was the use of roles, with each teacher playing a different role while solving the PBL. Teams found that teachers moderating, editing, working on design, and contributing creatively to the presentations were roles that allowed them to exploit the best combination of characteristics of each team member. Such roles had an effect in how decisions were made in teams and consensus was reached. One participant commented: “The group managed to consolidate a clear role for each member. The dynamic allowed decision making in group consensus” (survey 2). However, not only roles but rules also allowed groups to make better decisions. One interviewee noted: “Having defined rules and roles ensure good teamwork” (survey 2). Interviewee 3 argued how the environment that the team was able to foster led them to make better decisions, as she/he felt:
“Comfortable, we understand very well, we comply with our agreements, there was a good sense of humor, there was solidarity, we understood each other, in the times when we could not reach a decision easy, we vote... there was willingness to listen, we then distribute the roles, we all contribute in different ways and that made the work flow”

In item 13, teachers had to answer the following question: To what extent did you feel the relationships in your group change over time? The mode and median were 4, and the mean was 3.82, indicating that participants found that relations changed over time. On participant reported that relations “changed as more confidence was constructed” (survey 2). Two participants argued that their relations were good before the PBL, and they were used to working with each other, saying, “We already had good relations” (survey 2).

Finally, for item 14, participants were asked: To what extent did you feel better prepared for school change due to working with this PBL? The mode was 5, the median was 4, and the mean was 4.14. With the intervals 5 and four having the most frequencies, 73% between both, participants felt that this PBL prepared them for school change. One participant reported that this PBL “is a demonstration of the collaborative work and provide ideas that are the beginning of change” (survey 2). Another participant commented about the role in education: “I also can generate change” (survey 2). Finally, the voice that teachers have as a change agent was expressed by a third participant, who said, “it is important because it took into account the opinion and experience of all” (survey 2).

Survey Claims

The PBL Arboretum was a realistic scenario from the participants’ perspective. Arboretum was designed having Grove School as a starting point, and different components of Grove School were emphasized while others were set aside. The result for this first study was a PBL that presented a realistic scenario in education. It also allowed teachers to respond freely and honestly this PBL.
PBL Arboretum also allowed teachers to reflect on school change. Change does not come exclusively from outside of the school; it also comes from within the school, and it specifically comes from teachers. As teachers are the ones who lived in and recognized the school's reality, they were the ones that could foster school change.

Participants’ perceptions about collaborating with peers were also affected by the PBL. Teachers found that working in solving the PBL allowed them to reflect on their own educational practices and how they work together. The PBL gave them a space to listen others’ ideas, build on those ideas, discuss what was proposed, and find consensus upon what solutions and issues should be part of the common vision for school change.

Teachers’ perceptions of their role in school change may not have been altered but, but they were rediscovered. Participants became cognizant of teachers’ role in change, but there was also a lack of commitment to change. Some teachers reflected on their peers and argued that some teachers are not willing to change. On the other hand, others pointed out that change is not something that comes from outside, but it is within the school. Finally, one teacher argued that teachers have to change and focus on building knowledge.

Through the PBL, participants were able to find a common vision. They merged different perspectives and ideas into a solution for Arboretum issues. This was possible thanks to collaborative work through which teachers cooperated in solving issues and seeing problems from different perspectives. A deep listening environment allowed them to understand other positions and how those allowed them to build a holistic understanding of issues. Some of those different ideas were surprising. As a result, participants were able to build on their peers’ ideas. For these reasons, the collaborations participants found in the PBL a methodology influenced them in their decision making process. Furthermore, participants agreed that this experience would benefit all school faculty.
Interviews

Interviews were used to find what I could not observe while participants solved the PBL and what was not answered in both surveys (Patton, 1990) and allowed me to find out more from participants, as “we cannot observe how people have organized the world and the meanings they attach to what goes on in the world” (p. 278). Interviews took place one week after the PBL activity. The reason for this was that Grove School had its fall break and teachers were on vacation. The five interviews were done in an office with a closed door at the time that best suited each teacher. Each participant was randomly selected from his or her group. At the end of the activity, I gave each team a glass with five papers numbered from one to five. Each teacher took one paper from the glass at their team table. The teachers spoke their numbers aloud, and at the end, all teachers whom picked number 3 were interviewed. Each audio recording was transcribed in Microsoft Word, and the transcripts were read at least twice before they were coded. Finally, all interviews had a continuous number line to reference each code to a specific point in the transcript.

Yin (2013) pointed out that interviewing is the most important method for data collection in any case study. I designed semi-structured interviews, which allowed me to have more flexibly worded questions in each interview. The structure also allowed me to find data that was not easily observable (Patton, 1990). In some cases, while I was doing the interviews I found that participants had more information or insight that I hadn’t explored, and the semi-structured interview allowed me to add more questions, deepening the interaction with the interviewee (Merriam, 1998). I designed a protocol with different questions, but I played with the words in relation with each participant, and “this format [allowed] the [interviewees] to respond to the situation at hand, to the emerging worldview of the respondent, and to new ideas on the topic” (Merriam, Kindle Locations 951-952, 1998).
The coding process was done in Excel. The file had 5 columns: interview, question, line, code, and text. The first column, interview, referred to the chronological order of the interviews, numbered from one to five. The second, “question,” referred to the question of the interview where the code is found. The third, “line,” referred to the line number where the code was found in the transcript. The fourth, “code,” referred to the code that emerged from the data. Finally, the fifth, “text”, referred to the segment of the transcription where the code emerged. In table X1, I set up an example of this coding process in Excel. I added one column to this table, and that is the accurate translation to English.

Table 4 Coding examples for Interviews

<table>
<thead>
<tr>
<th>Interview</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question (Spanish)</td>
<td>De qué manera el trabajar con tu equipo en el PBL te transformo la forma como ve ese rol o el papel que tiene el profesor en el colegio?</td>
</tr>
<tr>
<td>Line</td>
<td>201</td>
</tr>
<tr>
<td>Code</td>
<td>Teachers role</td>
</tr>
<tr>
<td>Text (Spanish)</td>
<td>- Entonces el rol del profesor es? - Es construir conocimiento - Y antes cuál era? - Antes, cumplir con las expectativas del empleador.</td>
</tr>
<tr>
<td>Translation (English)</td>
<td>- Then the teacher’s role is? - It is to build knowledge - and what was before? - Before, meet employer expectations.</td>
</tr>
</tbody>
</table>

The codes that emerged from these interviews totaled 91. Among those, four emerged to the light. The first were collaboration (18) and PBL (18), followed by change (13), roles (12), and vision (6). Finally, as interviews were conducted in Spanish, all quotes were translated to English.

Collaborations

The first pattern found in the interviews was collaboration. DuFour et al. (2008) defined collaboration in PLC as “A systematic process in which people work together, interdependently, to analyze and impact professional practices in order to improve individual and collective results.
In a PLC, collaboration focuses on the critical questions of learning” (p. 464). What interviewee 3 reported throughout the PBL, was that they “became more efficient, time wise, in addressing issues they discoverer in the PBL”. Also, interviewee 1 argued that they were able to “build with their peers’ ideas” from different content areas, which added up to results. Interviewee 1 pleaded for spaces for collaboration, where “you put that creativity into context in which others could benefit from it”. Such a benefit comes in different perspectives, and one participant argued that people excel in some fields but not in others, so different people have different strengths in an array of areas that other do not, and this space to work with peers gave this participant an opportunity to be more open and with a better disposition to find others with strengths that she / he does not have. Also, participants suggested time as key component for collaboration. Interviewee 3 said:

“And then there is another aspect which is also given by the time, I think that having the time available to think about the situation presented in the PBL, all resources are better used, everything is used optimally”.

Furthermore, PBL Arboretum created a space for participants to find gaps in their professional lives to find affinity with teachers who had different positions, and it gave interviewee’s 4 team a space to “reflect on their own academic activity.” Other participants found that rules and voting allowed the team to ease the decision-making process. In addition, the teams were able to listen to each perspective, and everyone had a disposition to listen. Roles also contributed to the collaboration in teams, as interviewee 3 stated that “we distributed the roles, then everyone contributed in different ways and that made the work-flow.”

Arboretum PBL also offered time to its participants to build trustful relations among teachers. In addition, interviewee 2 was able to find teachers who would work with him/her in the future when issues arise:
“…And the day I have any difficulty or something to think, I already know that these people can also make contributions or I can ask them how they would solve a case or think about something or how they would handle a situation”

A content area leader, interviewee 3, added the dimension of responsibility towards professional development and the reallocation of time for professional development of those teachers who are in the early stages of their careers: “There is a responsibility that goes beyond not only coordinat[ing] the work [with them], but also train and supervise ...to work for the professional development team.” Finally, a new vision for professional development emerged—one that was not in the regular university setting outside of the school but was instead embedded in the groups’ collaborative learning, focusing on “collaborative learning, collaborative work in which from the strengths of each one, you can create strategies for the others to learn, recognize, validate those experiences and those skills of each team member” (Interviewee 3).

**PBL**

The second pattern emerged in this PBL. There were different ideas among the participants of how Arboretum PBL offered key benefits. Participants reported that the PBL activity they were enrolled in for three days allowed them to reflect on how to avoid certain problems and also how to resolve those issues if they ever encountered a similar situation in their professional life. What made the experience so enriching was that the PBL did not “frame it for you” (interviewee 2). Furthermore as the issues were real, the PBL presented people as they are in real life without idealization: “if I can understand that leaders sometimes have these shortcomings... it's easy to engage with the problem because I am reflected in it” (interviewee 1). That factor also allowed participants to engage with PBL Arboretum. Furthermore, such reflections led participants to change they way the listened to others, saying things such as, “as I start to change my behavior, [I] change my hearing ability or how [I] relate to others, [and]
apply what [I] just listen to [my] daily work” (interviewee 2). But this was not just one reflection over one exercise. What added flavor to the experience was that the PBL:

“Makes me reflect on real facts clearly and also had many variables that then have to be considered in order to get a conclusion that is consistent. Then you get different views, different perspectives, to take it as a whole are required, and I think that was precisely the determining value of the success that we had here” (interviewee 4).

As participants reflected on the idea of inquiry, of questioning to understand the context, the PBL demanded teamwork; collaboration is, in fact, in the center of the PBL because it is not possible for one teacher to see all the possible angles to solve issues. Only through collaborations could participants see more solutions. “We had to see all variables, [everything] influenced the problem, sometimes [I am] set in a variable and [I do] not realize that there is another [perspective] and many more” (interviewee 5). Such reflections also had learning outcomes, as participants found the PBL experience taught them how to solve situations and prepared them to face similar situations in the future. The difference now was that they knew how to solve issues: “it is good to have as patterns or situations that are similar where one can take as common points that serve to solve other similar situations” (interviewee 2). Finally, PBL offered participants a way to close the gap between the actual teacher and the ideal teacher: “the researcher teacher, [a] dedicated teacher, [that ideal teacher did not change], but then I realize[d] that it is possible to become that ideal teacher” (interviewee 4).

Change

Groups’ relations transformed in some way because PBL allowed teachers to have time to “change because there was time, because we took the time” (interviewee 2), which included the time and resources that they did not have in their regular professional life to invest in a PBL, reflect, make decisions, and think about change. Teachers also reflected about change in terms of perceptions, as one participant articulated that educational change comes from external forces: “I
think before I expected or understood educational change as something that came from outside” (interviewee 1). This interviewee also understood educational change and the teachers’ role in this process as a realistic one:

“…Because we know the people we work with, but also we have a more comprehensive view of the school, exchange of knowledge and experiences that allows us to see the school in a broader context, we recognize the reality of where we work but we are in a universe of situations and variables we also have to consider, then suddenly I think that construction is very enriching and a little idealistic because in reality there is more that needs to be done in a school that you can think of” (interviewee 1).

And such educational change belongs to the “educational community, the parents, teachers, and students” (interviewee 1). Teachers, parents, and everyone who is part of the school can make change; it does not come exclusively from outsiders. Furthermore, other teachers reported that change is not easy, that it is linked to different and many factors, and that “you can start little by little it was also what we saw with the work and it does not happen in a second, you can start to make it happen” (interviewee 5). Change takes time, as this participant understood, and as Hall and Hord (2006) explained, schools do not change until teachers change.

For one participant, change could only happen within the zone of control that belongs to the teacher. In other segments of the school, the teacher does not “have a voice to say how you want the place, that does not happen, I do not find that space and for me that is a misfortune” (interviewee 1). Furthermore, the gap between the PBL and reality could not be bridged by one teacher. On the other hand, one teacher realized how important teachers are in a school and in educational change, saying, “actually I work in the PBL and the proposal that [we created as a team,] I realized that teachers are more important than I thought and teachers can create change and can generate changes not only help to them in class but all the institution” (interviewee 5).

Some chains were also broken thanks to the Arboretum PBL. A teacher reported that thanks to this PBL (interviewee 3), he/she was able to see beyond the traditional model of
education that they have in the school, saying, “the model is already in place but I can look beyond that and see if that design already exists. [Is] there something differently [that] I can do to achieve better results,” considering that there could be a better way of doing things, even though things are going great.

**Roles**

The fourth pattern found in the interviews was roles. Participants realized how roles played an important part in their work and in solving issues in the PBL. Such roles allowed teams to maximize teachers’ abilities while working on the PBL: “Then it was like the most creative part and that’s not my [best suit], so let’s say that you have to let others who are more creative” (interviewee 2). In addition, roles were assigned not only by the strength of each team member but also by knowledge. When a teacher in one theme had knowledge that would benefit the teams, the others changed their role to those that were more supportive. As interviewee 2 said, “when I felt that I had much to give, a more leading role, but when I didn’t have much knowledge of a subject... I try to work differently more as a support to that leader”. While teachers were solving the PBL, it required them to assign roles and try to change roles over the course of those three days. One group reported that for them it was natural how they changed their roles, saying, “it was nice because we took turns without realizing that we were doing all the roles” (interviewee 2). In one case, creativity needed a space and time to happen, for new ideas to emerge and be structured. The requirement for a nurturing environment to happen within the groups cannot only be determined by the PBL, but also each group needed to find those spaces to propose ideas to solve issues. As one teacher explained: “But other people are those who are producing then I must make room for the others to do it” (interviewee 2). The climate needed for these ideas to emerge needed to be a trustful environment with respect for different ideas, “we were all very respectful of others’ ideas we were all interested in doing something good I think that’s it, respectful and very dynamic” (interviewee 2). Further time to be heard was one key
lesson learned from one teacher, and this also built in the climate for solving the PBL, as one teacher said, “we take turns and each will have [his/her] its time to talk” (interviewee 5). When time to be heard did not happen, group dynamics could affect group efficiency to solve issues. One participant reported that they did not assign roles in their group; teachers assumed the roles they wanted, and those roles did not change. “I kind of felt I had to speak harder to be heard because that person initially said you're going to be this and it was not difficult” (interviewee 1). This participant also noted that things were kind of clear and straightforward, and also that teachers “had a clear perception of how things could work better” (interviewee 1). However, it didn’t work for this participant; one voice for a different approach might not have been heard in this group.

On the other hand, roles eased the way some groups worked and also gave protection for teachers in each team. As interviewee 3 said, “I could speak my mind about the role assign[ed] to other teacher, without that affect[ing] group dynamics”, so roles allowed team members to take a step back and criticize the role but not the person, which in time opened space to reflect and develop.

As I am exploring roles, there is a role for teachers beyond the PBL, which happens as a consequence of the PBL: “It is important to have spaces to create knowledge with peers, not always from the same area, -so what is the teacher’s role? ...To create knowledge” (interviewee 1). But again, the PBL was a space where teachers were able to interact with each other and find what one purpose a teacher has.

**Vision**

The last pattern found in the interviews was vision. All interviewees agreed that their group was able to find a common vision to solve issues in the Arboretum PBL. Interviewee 4 argued that each presentation had a theme and said:
“All groups had each presented as a stream that was like a synchronization on the ideas of everyone according to information he had shared had thought, all for one line but they had discussed these ideas that … that the reasoning behind every idea was the same but that the presentation or how to structure ideas if it was different.”

Interviewee 5 called for the urgency of solving the issues presented in Arboretum, saying, “Say we achieved the maximum. All we agreed that indeed those points on which we agreed were necessary, were fundamental and perhaps they were urgent.”

**Interview Claims**

Collaboration is a characteristic that interviewees reported as one main feature of their work in the PBL. Collaboration allowed teachers to build on peers’ ideas. Deep listening, rules, and respect motivated this process for peers and allowed participants to be creative and see issues from different perspectives. Such dynamics, with the opportunity for every team member to have a voice in and argue for a position, permeated the strength of the PBL participants.

Once more, collaboration needs time to materialize, and PBL Arboretum gave participants the time, place, and secure simulation to face a messy situation in education and present a common vision that emphasized educational change.

The time invested in solving the PBL Arboretum, focusing on collaborating with peers, endorsed teachers to reflect on their own academic life. Such reflection presented an opportunity to transfer their PBL Arboretum learning to Grove School’s practices.

Collaboration also required different participants to execute different roles. A moderator gave the group’s dynamics the opportunity to become efficient in collaboration. Moderators also allowed the workflow for participants to build on peers’ ideas, to be creative, and to give a voice to all team members. All of this would not have been accomplished if teachers did not trust each other. PBL Arboretum gave the space and time for teachers to collaborate throughout roles, rules, trust, listening to each other, building on peers ideas, and bringing ideas with creativity and
different perspectives. PBL Arboretum also engaged participants in a setting in which they were able to change how they collaborate. This PBL did not outline participants and their interactions; it presented a real situation with daily issues that any educator may face in their career. Also, participants comprehended that collaborating allowed them to change their perspectives, with a wider view and understanding of the school and educational change. Finally, participants’ perceptions about teachers’ roles in educational change evolved into the idea that change does not come from the outside of the school but from within, with the teachers; they are the ones that have to change, so the school may change.

Roles in educational change have different layers, and teachers had assign roles to solve the PBL. Such roles permeated collaboration and the construction of a common vision. In these roles participants took notes, moderated conversations, designed the final presentation, gave voice to all participants, sought consensus, and in some cases voted. Some participants found their own roles within the team, but there was a commitment to be productive for the team and the construction of a common vision. There was a sense of accountability to be productive and collaborate with the team goals. Roles and the PBL as a simulation offered a safe space for participants to take risks, find different perspectives, and offer alternative solutions, which allowed all team members to benefit and build on those proposals.

**Presentation and Final Product**

At the end of the PBL, each team did a presentation of their issues in Arboretum and how to implement solutions to those issues. Finally, two weeks after the final presentations, teams delivered their final product. Each team had to “prepare a 5 year action plan (5 - 8 pages) that embodies your team solution and implementation to the problem at Arboretum” (PBL Arboretum, 2014). I decided to report the presentation and the final product together because both documents tended to repeat each other. The data found in both documents were very similar, so in this way I condensed all the data from each group.
Each team did a presentation to explain how it came up with the different issues that Arboretum was going to face in its coming future. Also, each team developed a 5-year plan to address such a situation and change the school. The presentation (Pr) took around 15 minutes and 20 minutes for only one team. At the end of each presentation, the panel was ready to answer questions from the other teams. Each team took between one to two weeks to submit the final product. Final products were between 3 to 12 pages and were reflections on the presentation. Together, the teams valued the experience and perspectives from the veteran teachers as well as what novice teachers could contribute to their action plans.

**Issues**

For the first part, teams found common ground on their different issues; one pattern was how to share the knowledge, to make it available for all the teachers and not only veteran teachers. Team 4, in the Final Product (FP), wrote, “the experience, knowledge and leadership are centered on department heads, whom are close to retirement at the same time”. Only team 2 (preschool teachers) recognized in their FP that knowledge lies on the shoulders of veteran teachers and also those with those who were less experienced: “there is not a space in [which] to share experiences of teaching both department heads (much experience) and teachers who have less experience but equally valuable experiences.”

**Team 1**

With a common issue for all teams to solve the PBL, the paths showed different approaches on how to solve “The wisdom gained by the heads of department and teachers with more than 10 years old is not being transmitted to new generations of teachers” (Pr. Team 1). Team 1’s solution created a team of experienced teachers who had hierarchical positions in the school, along with two external advisors. There had to be a profile for the advisors, a clear manual stating what they have to do, and those advisors needed to “Present [a] work proposal for building a learning culture” (Pr. team 1, Slide 9). This team needed to diagnose the
preschool’s admissions process, students’ results, and psychology reports (Pr. team 1). At the same time, the school was going to assess its current professional development requirements, and to do so, the team was going to do interviews, give surveys to teachers (anonymous), conduct class observations (content area leaders and peers), and have teacher evaluations conducted by students and content area leaders.

The fourth part of this plan was to create a bridge between preschool and elementary teachers to strengthen their communications. They said this would be a “space discussion take place and it guarantees free expression, to consider the contributions of all team members, to promote the design of tools and strategies to support struggling students” (FP. Team 1, p. 6).

The fifth component of this proposal was the reengineering of the content area leaders’ roles. Team 1 proposed that meetings must focus on coaching, and content area leaders should reshape their responsibilities to center their attention towards work with teachers. In addition, a new profile for new teachers needed to be developed with psychology and human resources. Finally, the last component of this proposal was the creation of “strategies to generate mutual trust between content area leaders and teachers” (Pr. Team 1, Slide 12).

Team 2

The second team, preschool, presented their issue as “Lack of a strong learning community that promotes professional development for teaching staff” (Pr. Team 2, Slide 3). The action plan was “Towards a learning community, we can all contribute to grow” (FP. Team 2). Three main objectives were set into place to fulfill with this plan. The first focused on the need to preserve the knowledge that had been constructed over the years at Arboretum. The second was the need to build a sense of belonging for teachers and content area leaders. The third and last was how content area leaders and teachers were able to share their pedagogical and administrative experiences (FP Team 2). For the first step of implementation, the team required time reallocation where students would leave early one day of the week and teachers would be able to work
together in a professional development. The work for this period of time was getting the staff tuned in to peer coaching and sharing the 5-year plan. In addition, teachers would work together and share best practices in addition to class modeling. At the end, coaches and teachers would observe classes. At this point, an evaluation of the process would be done in year 2, and adjustments would be made so the process could start all over again (FP Team 2).

**Team 3**

The plan to address issues by this third team was a cell system. The goal was to “decentralized functions and responsibilities” (Pr. Team 3, Slide 6). At the end, the proposal was for a network of cells working together (see Graph 1). Each cell identified issues in the school that were addressed in Arboretum. Each cell was responsible for designing and implementing strategies to address these three main Arboretum issues.

Group three presented 16 different issues, and from those they selected three. The first, as for the first two groups, emphasized “community relations” (Pr. team 3), as such relations were how experienced teachers could share with novice teachers—not only sharing experiences but also researching and sharing results from those investigation. Participants of this team acknowledged that such institutional efforts require financial resources allocated for professional development. Finally, community relations referred to strategies about how to give feedback to teachers (FP Team 3). The second one is “legacy to new demands” (Pr. Team 3, Slide 2). This team explained that there was no evidence of strategies that create a bond between teachers and the school. Level meetings did not have a protocol and created low effects in the community. The last component of the legacy was the radical vision needed to attend new demands under the umbrella of “innovations does not means elimination of what has been learned” (Pr. Team 3, Slide 2). The last issue referred to desertion, seen as student desertion and a need to recognize and internalize the school values.
Team 4

This team found five main issues in the PBL Arboretum. The first was the lack of knowledge transfer from one generation to the next. The second also referred to knowledge transfer but that between peers. The third issue was the lack of time allocation and strategies for professional development. Issue four was how new teachers did not have legitimate interests in staying at Arboretum. Finally, issue five described how meetings built into the schedule were not being efficiently used (Pr. Team 4).

To transfer knowledge and address the first issue, this team implemented a selection of possible leaders, selected by the content area leaders and the principal. Content area leaders were going to study and develop a coaching plan for these leaders. In addition, an “Arboretum excellent practices manual” was going to be produced in this process (Pr. Team 4).

Likewise, to transfer knowledge among peers and address the second issue, team 4 planned to open the classrooms doors for observations with the objectives of finding strengths and needs for pedagogical practices. In addition, new or novice teachers would have a tutor that would go with them for a period of time (unfortunately it was not clear for how long, either in the presentation or the final document). One requirement was time allocation for coaches.
and teachers to be able to work on the first two points. Finally, as teachers would be working together, everything would be documented and shared with the institution (Pr. Team 4).

For the third issue, the team opened space for content area leaders to work with their teachers and assess teacher performance with evaluations that open a space to increase dialog between content area leaders and teachers. Assigned work for training was built into the schedule, with that work placed in a matrix that would explain training needs. As this had to be a free choice for teachers, incentives would be provided for those teachers who participated in the professional development program and collaborated with the creation of personalized professional development programs. Finally, experts would be included in the school to guide teachers in their learning process (Pr. Team 4).

In issue four, for teachers who did not have legitimate interests in staying at Arboretum, the team would try to setup relations with universities to make Arboretum a site for interns as well as to hire teachers from those interns. Also, the teacher profile for Arboretum would need to be assessed so the school could hire teachers who would stay in the school. New teachers would be invited to participate in a program for educational innovation and participate in workshop to increase their sense of belonging to Arboretum. Arboretum would also create sports activities and reevaluate teachers’ schedules to allocate time for this purpose (Pr. Team 4).

The final issue described meetings built into the schedule that were not being efficiently used. The plan was that everyone who was participating in a meeting would need to collaborate in the creation of the agenda. Also, all information would be emailed prior to the meeting. For the meetings, there would be session where a brainstorm would take place, with the objective to empower teachers to find a path to enhance meetings. In addition, protocols would be implemented so everyone had a voice. Furthermore, objectives for each meeting would be set up and be measurable. The team would also analyze how much time was required for meetings and allocate the time require to guarantee them (Pr. Team 4). The objective of working with this fifth issue was to “promote a culture of learning” (Pr. Team 4).
Team 5

The final group identified two issues: “generational transfer and institutional revitalization” (FP team 5). The action plan for addressing these issues was the creation of a leadership and decision making program. The objective was to allocate resources for such programs, and teachers’ experiences in such program would be stored and shared with future generations (FP team 5).

To address the first issue, generational transfer, the team designed five processes. The first was the establishment of a retirement time. In this process, the principal and content area leaders would get together and agree when a content area leader should retire; therefore, they would convene when the accompaniment program was going to start, which must be done at least three years in advance. The second process was how content area leaders would work on the “importance of structural change” (FP team 5), and they would be trained in how to make that transfer. The third process was how the new profile for the future content area leaders would be formed. These teachers must have a compromise with the institution and their life plan aligning with the school’s vision for its future. Time that candidates had been teaching at the school would also be taken into account. The fourth process was the selection of candidates, as each department must have at least 2 or 3 candidates upon whom knowledge would be transferred. The final part was accompaniment; this process must always be done, even when content area leaders were not ready to retire (FP team 5).

To address the second issue, institutional revitalization, “all members of the educational community assume a real commitment to change leadership and the transformation of teaching and learning processes that require new generations of students” (FP team 5, p. 3). This would be done by research teams made up of two teachers from each department. These teams would start a “research process to identify the needs of new generations of students” (FP team 5, p. 4). Outcomes of such research would be shared with the institution, and the research team would work on solutions to the issues that guided this final product.
**Presentation and Final Product Claims**

The common vision for school change across all of the teams was that they based their solutions in collaborative work. Teams created solutions with time allocation for teachers, and in one case external experts, to collaborate. Teams set up networks of teachers collaborating with the purpose to solve educational issues. Knowledge crafted over years was another of the common issues addressed by all teams. One team suggested the creation of a practice manual, built throughout collaborations among veteran and novice teachers. Other teams transferred knowledge through collaborations among teachers by coaching, peer coaching, or professional development. Teams also found a time for collaboration occur, as in the PBL. One example was the change in the schedule of one day a week, when students leaving early allowed teachers to work together in professional development. Finally, teams emphasized how collaboration must be effective. Collaboration may not always be effective in the use of time or in its objectives, so the creation of protocols and collaboration assessment were essential for effective collaboration.

**Common Themes Across All Data**

As a first approach to answer the research question, the common themes that were found across the data follow. Triangulation allowed me to report on three different themes and patterns identified in all my data collected.

**Teachers and school change**

In both surveys, participants reported that the PBL actually influenced their thinking about school change, as it allowed them to see things from a different perspective or an angle that they had not considered. Also, teachers’ perception of change in schools used to be that it was something that took place outside of the school, done by a university or the central government. However, in working on the PBL, participants realized that teachers are the ones who know their school and the students’ reality. Hence, educational change belongs to the school community—
not only teachers, but also parents and students. Teachers not only changed their perception about school change, they also felt prepared for school change due to their work in the PBL. As new ideas of change emerged in collaborative work, teachers felt that they were also the engine that creates change. A key factor of the PBL was that it gave voice to teachers and valued their experience.

On the other hand, change also needs a place and time to materialize. Teachers reflected on how time allocation to solve the PBL allowed them to think and make decisions about change. The PBL offered a space outside of the teachers’ “control zone” to work and think about change outside of their routines. As new ideas emerged, a different perspective of the school reality came to light, with a new vision of an educational model, an idea of school change to achieve better results that motivated teachers to embrace change.

Finally, in the presentations, teachers were always part of the change process. On one side, teachers within the school had knowledge from which any other teacher could benefit, and at the other side, students would gain better educators through the process. Ideas such as a plan to connect preschool and elementary were only doable if teachers worked together. All teams presented different approaches of how to do what they would do at school but focused their effort in creating trustful relations, time allocation for coaching, building teams that do not exist, and becoming more efficient in the use of time.

**Teachers and Collaboration**

Collaboration is an important component for school change, but not all collaboration is focused on improving individual or collective results. The PBL Arboretum engaged 24 teachers in groups of five and one of four in a collaborative dynamic. The first step to achieve such results involved rules established by each team but suggested by the PBL. Different teams leveled their field by stating respect is one of their main rules. Other rules promoted communication for collaboration. In some teams, there was a rule to contribute to discussions. In other teams, roles
also provided space in which every member could collaborate. Such groundwork permitted teams to work harmoniously in most of the cases. Humor was an outlet for the building pressure. Teachers were so conscious of the need of humor that it became, in many cases, a rule. The second step was the allocation of time and resources for teachers to be able to reflect on what are the main PBL issues. Such reflection required an exchange of ideas and experiences to accomplish a common vision. Teachers not only valued and learned, but also changed or reinforced some of their perspectives while solving the PBL. A reference for a safe environment combined with building on peers’ ideas gave participants the opportunity to take risks and let surprising ideas emerge in their conversations. Teachers came to value that the PBL enabled them listen to others’ ideas, let them compete with their own, and build on others ideas, which was an achievement for the participants.

To work in collaboration is also to impact professional practices. Teachers were able to become more efficient to solve issues in the PBL, but there is no reason to believe that such skills may not be translated into their educational practices. Collaboration does not always have to do with teams of teachers that work together all the time. In this PBL, teachers from different areas were grouped together. One team found this type of team gave issues different perspectives, so in their final products were formed by input from teachers in different areas. Each team was a sort of a cell, and their responsibilities were to solve Arboretum issues.

To co-labor with others, as teachers reported in the PBL, requires an open space for creativity. From such creativity, new ideas emerged. Some of those where used, while others were left behind, but all the teams had the benefit of seeing issues from different perspectives and building with peers those perspectives that could open the field for educational change. For example, one participant offered a surprising solution for teacher retention. He/she proposed that Arboretum might offer teachers credits to buy a house. However, this idea did not make it to the final product or presentation of his/her team. A final component of collaboration is the responsibility that teachers have to collaborate and focus on learning from other members of the
community. Teachers are accountable for sharing their knowledge to develop new knowledge in
benefit of all the community.

**Teachers and Common Vision**

Teachers agreed that within their teams they were able to build a common vision for
school change. Surveys results revealed that almost all participants in the PBL agreed with a
common vision. In fact, that agreement increased from the first to the second survey. Participants
were able to share ideas, reflect on peers’ ideas and fuse those ideas into one proposal so
Arboretum issues could be addressed. Team members listened to peers’ ideas and built on those
ideas, so collaboration indeed was one major component for teachers and teams to come to find a
common vision and construct a common vision. A common vision is not easy to construct.
Teachers had to brainstorm, vote, and in many cases find consensus on ideas to solve issues, and
so the common vision was the result of the exercise of collaboration, of ideas of the teachers’ role
in educational change, and how decisions were made within the team to find a final product that
solved educational issues.

In the final product and presentation, each team offered one plan to solve problems in the
PBL Arboretum, showing one common vision. In interviews and survey reports, teams also strove
for effective collaboration, consensus, and listening to all ideas to build on peers’ proposals. Also,
teachers reflected on the experience and different perspectives that in some cases weren’t easy to
assimilate, but this exercise allowed them to build their vision for change. These characteristics
were incorporated into the final product and presentations. Collaboration was presented in the
coaching initiatives, to set up meetings ensuring a safe environment where teachers could express
their ideas. As one characteristic of PLC is a shared vision, teachers were able to find that
common vision while facing this PBL. But teachers also needed to collaborate with each other to
find a common goal and solve educational issues that in all cases required change.
Teachers and Roles

Teachers agreed that they are one of the central factors of change and that their role is the focus of any educational change. If teachers do not contribute to change, as one participant realized, there will be no change. However, some teachers do not want to embrace change: they are comfortable in their current situation and are not willing to move in a different direction.

The structures presented in all the presentations challenged Arboretum’s current culture and invited Arboretum’s teachers to change their routines, open the doors of their classrooms to peers, collaborate outside of the classrooms, and evaluate their performance. But the shift was not only about perception of school change but also the teachers’ role in change. In the surveys, one participant reflected how teachers could offer contributions in favor of educational change. Also, a difference was expressed between knowing teachers’ roles in school change and actually engaging in school change, “but there has been little action”. Again the appearance of “little action” may be because some teachers haven’t realized their potential. When teachers recognize their role in school change, they have a comprehensive view of the school that empowers them to become a fundamental component of that change.

Research Questions and Answers

I will start answering the sub-questions, and finally I will answer the main questions that guided this study. The purpose is to construct an argument with the answers for the sub questions; consequently, I am able to answer the main research questions.

Sub questions:

1. What effect does participation in Problem Based Learning have on teachers’ perceptions of school change?

As teachers solved the PBL Arboretum, different perceptions emerged for school change and teachers realized in some degree that they are part of the change and that schools would not change until teachers change (Hall & Hord, 2006). Teams also realized
that there was a need for change and that Arboretum’s current practices demanded a new way of working, in particular a culture that favored collaborative work. This was clear in all presentations and final products, as collaborative structures were built into the plans in the form of meetings, coaching, and groups of teachers in different levels working together. Such collaborations had purposes such as making a contribution to growth, transferring knowledge among all teachers, and improving community relations.

2. How does PBL affect teachers’ perception of collaboration with their peers?

Different characteristics emerged from the data referring collaboration. In terms of time to collaborate, teachers in the PBL found time to work with peers, discuss, find common ground to make decisions, and agree upon those decisions. But collaboration is not only about time but also rules and roles. Rules allowed teams to make decisions. If there was no consensus, teams could vote, and rules also offered a secure environment for different ideas to emerge, with time to listen to every participant. Also, in some cases there was the responsibility to share ideas and not always stay quiet.

3. How does PBL affect teachers’ perception of collaboration with school administrators?

For this question, I did not find enough data. The only data available were from the interviews. Participants reflected on the challenge that administrators have in their hands. One teacher reflected on how Grove School was able to open the space to make this type of activity as a first step towards change. Also, the school directives address these issues. Finally, one teacher realized that the administrators’ responsibilities go beyond budgeting.

4. How does teachers’ experience influence their decision-making processes?

PBL influenced the decision-making process on different levels. First of all, the concepts of roles and rules allowed teams to collaborate. In collaboration, teams were
able to brainstorm different perspectives to solve educational issues. Those rules enabled the teams to make decisions as a team, not as one leading and others following. For most cases, the opportunity that each team gave to its members allowed them to see different perspectives on different problems and prioritize.

5. How do teachers understand their role in school change?

Teachers’ role in school change emphasized how the teachers were responsible for creating, crafting and sharing their knowledge. Further, the need for teachers to have time for sharing and crafting knowledge was presented in the final products and presentations. For teachers to play their role in school change, time allocation becomes critical. If teachers do not have time to collaborate and create knowledge, their role in school change is at risk.

6. How does participating in a PBL influence teachers’ readiness for participating in a Professional Learning Community?

This PBL influenced teacher readiness for participating in a PLC in that it offered a process of collective inquiry among teachers. Teachers and teams agreed that most plans and final products’ goals related to teachers’ development, as with better teachers a better education can be available for students. All this work was done in collaboration, as teachers had time to work together solving educational issues, which impacted teachers’ learning and may also impact student learning. There was no evidence to that supports this becoming an ongoing cycle, but plans presented by each team offered the idea of cycles in their process. This PBL may therefore be seen as a first step to prepare teachers for a PLC.
Main Questions:

1. How does PBL influence teachers’ perceptions of school change?

   Teachers were able to work collaboratively, with rules and roles that gave each team a trustful environment in which to take risks in their ideas for solving educational issues. Teachers also felt empowered to think about school change by solving a simulation. Teams elaborated on plans with clear tasks to start journeys of educational change. Teachers’ roles in the school changed, as participants saw that teachers could collaborate to build knowledge and share it with other members. Teachers therefore became the ones that established a common vision for school change. They also became the key participants during implementations, evaluation, and knowledge construction, acknowledging that schools do not change until teachers change.

2. How does PBL help teachers establish a common vision for school change?

   The PBL Arboretum required teachers to create a plan to solve issues for this school. Such plans required educational change, as the school had to change the way things were done. Almost all teams agreed on the idea of reshaping the way Arboretum’s teachers teach. In the presentations, teachers were engaged in collaborative work, and all plans addressed the issue of transferring knowledge from one generation to the next. To do so, time for collaboration, trust, rules, and roles were the characteristics that supported common visions for school change. The common vision for PBL Arboretum developed by the teams also gave the main role to teachers, as they are the ones who are going to solve educational issues by working in collaboration.
Summary

In this chapter, I presented the data collected for this study. Data came from observations done while participants worked on the PBL Arboretum, two surveys completed anonymously, five interviews, a final product, and a presentation by each team. Survey data was presented in Excel and, inferences were made using measurements of central tendency. In addition, survey findings were supported with data from other sources including survey comments and interviews, which were transcribed and coded in Excel. The final products and presentations were also coded in the same file. From the codes, themes and patterns emerged, which allowed me to answer to some degree the research questions that guided this research. Three main patterns appeared. The first two involved teachers and their role in school change, along with how teachers were able to collaborate while working in the PBL Arboretum. For the third, participants changed their views or confirmed their ideas about educational change, considering teachers’ roles as a key factor for educational change. In the end, the teams saw that with collaboration, teachers could find a common vision for school change.
CHAPTER 5
INTERPRETATION AND CONCLUSIONS

Introduction

This introduction is a recapitulation of the first four chapters. I will review why Problem Based Learning may influence teachers’ perceptions of school change and whether PBL may help teachers establish a common vision for school change. The PBL used for this study followed guidelines developed by Bridges and Hallinger (1992), whose work focused on preparing future school administrators for their role as leaders. The focus of any PBL is to set up a simulation, offering a safe environment for participants, where they face messy situations, or “swampy problems,” without clear solutions. Most PBLs have participants address the task in teams. Issues presented in a PBL may be similar to those that participants will face in their future. Key characteristics differentiate PBL from regular curricula and from cases typically used in the schooling and preparation of lawyers. Namely, PBL blends educational experiences and educational objectives and is organized around problems that result in collective learning from a shared experience. These characteristics may call for a PBL to engage participants in professional development initiatives in which they collaborate in problem solving.

Pilot Studies

To explore the needs for this study and its application, two pilot studies were conducted. The first followed Bridges and Hallinger’s (1992) advice for testing the PBL. A PBL, Tradition and Growth at Arboretum: A Problem Based Learning for Educational Research (TGA), was developed for the first pilot. The results of this pilot study allowed me to reshape the PBL into Arboretum, the PBL used for this case study. There were two major adaptations. The first focused on support material provided to participants to help them resolve issues presented in the PBL. While solving the (TGA) PBL, participants requested additional information about the school. Participants wanted to have access to how many teachers were there in Arboretum, their
experience, the school’s size, meetings, and time allocation for professional development. Such information did not alter the situation presented in the PBL, so such material was developed and delivered to participants. The second adaptation to (TGA) came after the final presentations in this pilot. As it turned out, teams primarily focused their attention on solving one particular situation of a teacher who retired from the school and left the organization. To solve this situation, participants decided that the teacher in the PBL should be rehired for three more years. However, the participants’ focus on this single problem drew their attention away from the larger picture they needed to consider and ultimately served as a distraction.

The second pilot study was born from the need to test how teachers may react towards a PBL experience that more closely resembled their reality. For this pilot study, the PBL A Supervisor’s Dilemma was selected. This PBL was solved in Grove School, where the study itself took place. The result of this pilot study showed that teachers enjoyed the experience, but they wanted a PBL closer to them, a PBL closer to Grove School that they could apply to their professional lives in the school they work.

Numerous lessons were learned from both pilot studies. The first was how observations and field notes may offer unique insights about teachers solving the PBL. Also, observation of these pilot studies allowed me to set up a better timetable with more realistic expectations for teachers as they worked to solve the PBL. The second lesson learned was to include surveys to monitor any changes in teachers’ perceptions while working on the PBL. The third lesson provided an understanding of how a PBL’s final product and presentation had the potential to offer unique but rich data for analysis. The fourth lesson was the value of follow-up interviews. In this first pilot study, I did not conduct interviews. However, I realized that they would have given me insights into teachers’ thinking. The individual interviews in the final study allowed me to ask teachers privately about their PBL experience without peer pressure or the rush of time. Interviews also allowed me to compare feedback from the surveys. The final lesson had to do with me as a researcher. I learned not to answer all of the participants’ questions while they were
involved in solving the PBL, because in doing so I would bias teams’ answers. I understood that I should only answer questions to clarify information within the PBL or supporting materials, but it further became clear that I should avoid answering questions that would in any way guide how to solve issues in the PBL. Finally, I learned the importance of knowing how to group teams so none included authority figures that might undermine some other participants while they were working on the PBL.

PBL

Problem Based Learning has its origins in medical education. It exposes participants or students to an instructional curriculum in which they face messy and interdisciplinary problems drawn from professional settings and experiences (Bridges & Hallinger, 1992). PBL initially provided a solution for the problem of medical students who were not prepared or equipped for long-life learning. In addition, because students rely on memory and memory can fade over time, PBL could serve as a new instructional approach that emphasized the idea that students are responsible for their own knowledge and allowed participants to start a journey in solving problems. This instruction in PBL can be accomplished by the use of real-life problems without a clear solution, whereby participants work at solving problems by integrating different disciplines. One of the main components of PBL is that all this happens in a collaborative environment in which participants are self-directed. In the end, PBL’s learning occurs when students are solving messy situations together. Evaluation as a key component of the PBL is done by the participants, not by the teacher, and it is the activities most valued in real life that are carried out in the PBL (Barrows as cited by Savery, 2015). As may be suspected, PBL found its way from medicine to many other disciplines (Gijselaers, 1995), and the one used in this study was presented by Bridges and Hallinger (1995). The authors add sixteen PBL characteristics, building upon Barrows’ PBL.
PBL offers unique opportunities to prepare school leaders for their future careers in their schools. PBL’s core resides in knowing and doing; in fact, through PBL, school leaders learn while doing. The obstacles that PBL faces are the time required to design and test PBLs (Bridges & Hallinger, 1995; Bridges & Hallinger, 1992). PBL instruction, compared with regular instruction, usually falls short in time necessary to complete the curriculum (Albanese and Mitchell 1993). Finally, PBL requires smaller classes sizes; thus the goal for a teacher is to have fewer than 40 students per class.

**PBL’s Influence on Teachers’ Perceptions of School Change**

**Educational Change**

This study was framed within different change theories, with the first presented by Fullan (2003 & 2007). He introduced eight change lessons and a three-stage model. Subsequently, Hall and Hord (2006) introduced the CBAM and 12 principles of change. Kotter (1996) also presented an eight-stages process for change. Senge (2012) introduced the idea of schools that learn and described how to build a shared vision for them. Finally, DuFour et al. (2010) presented Professional Learning Communities. There is common ground for almost all of these theories. In short, school change is not easily accomplished, and it only works out if teachers change, supported by the administration. The challenge is for teachers to actually change and keep changing over time. It is an ongoing process, as DuFour et al. (2010) state. And the most valuable aspect of change is not the destination, it is the journey (Hord & Hall, 2005; Fullan, 2003).

**Methodology**

The methodology chosen for this study was decided in order to accomplish the demands of the research questions. A case study allowed me to investigate how a PBL influenced teachers’ perceptions about school change. A case study methodology was selected because of the types of questions this study undertook. To understand teachers’ perceptions, I had to see the events
during my data collection in terms of the teachers’ perspectives, and I was therefore able to explain how the PBL influenced teachers about school change. This case study allowed me to find meaning in how participants understood the situation in the PBL Arboretum, how they were able to collaborate, and how they were able to construct a common vision that demanded a change in Arboretum. As participants were the ones guiding their teams and solutions, I did not have control over their choices or behaviors. Finally, as Yin (2013) explained, case studies’ third condition is that they should be conducted on a current event in a real life context.

Participants were purposefully selected because in Grove School, where the study took place, there were almost 120 teachers, and less than 25% were selected to participate. The selection was done with the purpose of having the most representative sample of the school in order to better inform the study (Krathwohl, 2009). In addition, groups were also purposefully assembled. The objective was to allow all participants to take risks and share ideas, and for that reason, teams were composed of peers with no hierarchical relation. The unit of analysis for this study was the teachers participating in the study. Finally, the PBL Arboretum bounded this case study, as only teachers who worked at Grove School and solved Arboretum were part of the study.

Finally, the methods selected for this study were participant observation field notes, surveys, interviews, and document analysis. As the PBL Arboretum required teams to produce a final presentation and a final product, those two documents were also analyzed. Additionally, all participants answered two surveys anonymously. All questions in the second survey had a space for participants to make comments. The second survey had seven questions presented in a different order from the first survey; the purpose was to assess any change that took place while the participants solved the PBL. Interviewees were randomly selected, and each team had one interviewee. All interviews were audiotaped, transcribed, and coded.

The study was assessed by addressing a rich amount of data from different sources. I also conducted a member check by selecting two participants to assess my claims. I had to select
participants who spoke English, because not all participants did, and the two participants chosen belonged to different teams. I also searched my data for discrepant evidence and negative cases. Two cases arose, but they were not considered as a validity threat. Finally, I triangulated data from different sources for each claim.

Claims or Assertions

There are four main assertions for this study. As Ravitz (2009) called for papers that study PBL and their effect on teachers, the four assertions focus on PBL and teachers’ perceptions of their role in school change, collaboration, and crafting a common vision for educational change, as well as how the PBL developed for this study may be used for other studies.

PBL’s Influence on Teachers’ Perceptions of the teacher’s role in change

Change comes from inside and outside. Participants realized that external forces that may govern schools do not only drive educational change. Teachers found that school change came from them, professionally teaching students, learning and comprehending complex realities, and that organic schools systems were so complicated that they require one to live in the culture to recognize how change may be accomplished.

Teachers’ role in educational change became the focus of any initiative. Participants’ solutions for all issues presented in Arboretum always gave teachers working in collaborative teams the central component of their plans. This is significant because nothing may change in any educational setting until teachers set their minds to change (Hall & Hord, 2006; Fullan, 2003). Because schools have to be improved and change themselves, the requirements are the right conditions to undertake change initiatives (Barth, 1990). The teams in the PBL each designed a vision for educational change, and the core for those initiatives was at the center of the school, in its teachers.
**PBL’s Influence on Teachers’ Perceptions of the value of collaboration**

Teachers who solved the Arboretum PBL collaborated to accomplish the final product this PBL required, presenting solutions to educational issues included in the PBL. The PBL allowed a free and helpful exchange of ideas among participants, and in the end it fostered teacher collaboration through different means. While Grove School administrators and teachers allocated time to solve the PBL Arboretum, the PBL reflected a reality not far from situations that teachers and school leaders may encounter in their professional careers. Because the PBL was a simulation, the participants had a safe environment in which to collaborate on solving its problems.

Teachers had time, but they also created their own team rules. These rules favored effective collaboration, so team members could listen to and understand other perspectives and ideas. This process allowed the participants to have a systematic view of the organization and comprehend the school as a whole, so in the process of collaboration the enriching perspective allowed them to have a final vision that presented a journey for educational change. This process aligns with proposals (DuFour et al., 2008) of creating a common vision for change. In their definition of a PCL, there are ongoing cycles of inquiry, but one component is the collaboration among teachers (DuFour & Fullan, 2013).

In addition to rules, teams also created roles that facilitated collaboration. The value in such roles was that they allowed teams to give a voice to every member, to respect controversial ideas, and to foster understanding. Furthermore, roles allowed teachers to build on their ideas. Facilitating change is a team effort (Hall & Hord, 2006). The roles empowered teachers as moderators to be creative and design the final presentation, to be strong and share their ideas, and to challenge if the role was not being executed as expected. The use of roles also allowed members to critique the role and not the peer.
PBL’s Influence on Teachers’ Perceptions of Developing a vision

Each team was able to develop a common vision for educational change. This was achieved through collaborative work. The PBL enabled teachers to construct structures that challenged Arboretum School’s current practices and focused their work on creating collaborative teams within the school to implement educational change. As noted above, change is a team effort (Hall & Hord, 2006). PBL Arboretum also empowered teachers to think outside of their routines and reflect on their role as teachers, one that goes beyond their classroom and focuses on the whole school. It allowed teachers to think more in terms of systems, as they focused on understanding relationships within the school, resulting in a common effort toward a collective vision (Senge et al., 2012). Further, PBL Arboretum led them to question their academic practices and set up teams to articulate a vision for school change.

PBL’s Influence on Teachers’ Perceptions of other uses for this kind of PBL

PBL Arboretum accomplished the primary PBL requirements: it was messy, different issues came into place (Bridges & Hallinger, 1992), and participants worked in teams to solve it. This study answered the following questions: How does PBL influence teachers’ perceptions of school change? And how does PBL help teachers establish a common vision for school change? Further studies are needed to answer the question of implementation of that common vision. In short, are PBLs enough to create a coalition (Kotter, 1996) or to become one initiation of change, as stated by Fullan (2007)? On the other hand, as PBL Arboretum was close to the participants of this case study, further studies using this PBL in a different setting may involve different assertions, and to compare final products and presentations may further the field with a comparison of results.

Participants, while solving the PBL Arboretum, reflected on their role in educational change. Evidence of Fullan’s (2003) lesson and Hall and Hord’s (2006) principle, that schools do not change until teachers change, was part of the participants’ reflection. Their role in change was
the focus of any change initiative. Hence, educational change is a process that belongs to the school and not just to organizations outside the institution, and teachers, parents, and administrators are the ones who make school change possible.

Certain requirements need to be fulfilled before change happens. In Grove School, there was time allocation for teachers to work together. This time was accomplished with the support of the school’s administration. Hall and Hord (2003) stated that for long-term success in change initiatives, administration and leadership are essential. Teachers cannot change their school without administration support, but teachers need also to find a path for collaboration. Collaboration was elaborated upon with the support of teams’ rules and teachers’ roles within the groups. In addition, the time that teachers had to think about school change provided another element that allowed collaboration to happen. Rules that promoted communication, respect, and humor allowed teachers to endure and collaborate through the process of solving this PBL. On the other hand, roles for collaboration endorsed teachers to be efficient in their decisions and solutions. Roles changed in relation to the characteristics of the task demanded by the PBL. Teachers working in collaboration must find a path to be leaders, to follow instructions, and to take a step back and let the team produce. Collaboration also allowed teams to make decisions. Thus, the atmosphere created supported teachers to brainstorm different ideas from multiple perspectives, and rules guided how teams made decisions. The PBL Arboretum engaged teachers in a simulation that allowed them to take risks without fear of consequences.

This study contributes to Fullan’s (2007) factors affecting initiation. Fullan stated eight factors affecting initiation: Existence and Quality of Innovation, Access to Innovations, Advocacy from Central Administration, Teacher Advocacy, External Change Agents, Community Pressure / Support/ Apathy, New Policy, and Problem-Solving and Bureaucratic Orientations. A PBL may be designed according to the factors affecting initiation along with a school’s needs and characteristics. That PBL would allow the community, teachers, and administrations to construct a common vision for educational change. Furthermore, their final
product would be the first step towards implementation. Teachers solving the Arboretum PBL learned about school change, their role in educational change, and how collaboration can be accomplished through rules, roles, and time.

Discussion

There are a few issues that I need to mention before I discuss further research. To start with, different decisions guided this study, and I want to review them. First, I will reflect on the advantages of having a PBL as a simulation instead of working directly on the reality of the school. The PBL Arboretum allowed participants to express their ideas in a safe environment. In addition, teachers felt free to explore ideas that challenged Arboretum’s culture without feeling threatened. The simulation provided a low-risk setting for teachers that otherwise would not have been achieved. Participants struggled at the beginning with the difference between Grove School and Arboretum, but this issue was overcome during the first morning thanks to a well-designed and administered PBL.

The work done with the PBL and its resemblance with the school also implied a decision-making process. The first option was to work with a simulation in a safe environment: the other choice was to work with the real school, where participants would be challenged to face their reality. To work with the PBL allowed teachers to brainstorm different paths to solve educational issues and gave them a comfortable setting to take risks. A second step, closing the gap between a simulation and something that teachers may find useful for the school, was the design of a workshop in which participants of the PBL presented their final products and alternatives for Arboretum to the school’s faculty. Afterward, the faculty could learn from those alternatives and craft and design solutions for Grove school and work on implementation. In other words, the PBL allowed the school and teachers to face school issues and solve them from different perspectives with less influence on the school’s culture, routines, and work pressures.
School leaders may find in PBLs a strategy to challenge their faculty into proposing educational change within the school. The PBL Arboretum was designed for a school that saw that many veteran teachers were retiring soon. The PBL Arboretum was crafted around a culture that valued knowledge and sought the participants’ help in solving its problems, a path to foster a culture where current knowledge and new knowledge challenged a school culture. In addition, PBL Arboretum was designed for a specific school. There are different components such as legislation, the community, teachers, and culture that must be adapted for public schools in other settings. The context matters.

A whole spectrum of PBLs may be designed for different purposes of studying and enacting school change. School leaders who create PBLs must follow key characteristics of a PBL (Barrows 1996; Bridges and Hallinger, 1995). In addition, school leaders must identify key informants within the school or the community to inform such designs. Support from the administration for educational change becomes critical, because solving a PBL is time consuming and teachers have to leave their routines and activities to focus on the PBL. One recommendation is to do this type of work before a new academic year starts. Teachers are going to be fresh and ready to reflect with their peers. Finally, the PBL Arboretum gave a voice to teachers, moved them away from their classrooms, and invited them to see the school a system and to start to migrate to system thinking (Senge et al., 2012).

**Further Research**

Educational change needs time and support for long-term results; this study focused its energy on the first step in educational change, in that teachers were able to construct a common vision for school change (DuFour & Fullan, 2013; DuFour et al., 2008; Kotter, 1996; Senge et al., 2012). A suggestion for future studies would be to focus their efforts on understanding the implementation of teachers’ vision for educational change.
More research is needed in the use of PBL to study teachers’ effect on educational change. This study provides a first step, but following Fullan’s (2003) factors affecting initiation, different studies may be designed for different schools. This study was also about teachers’ perceptions. Further research is needed to investigate the extent to which changed perceptions as a result of PBL can lead to productive action. How will teachers implement change? Why are teachers and administrators prepared differently? Further, based on the results of this study, PBL should be used in teacher education curriculum.

For this study, a PBL was used to determine whether or not teachers could create a common vision for school change, asking the question, Can a PBL be used for implementation of a common vision of educational change? PBL creates collaboration, which is needed for educational change. PBL Arboretum gave a voice to teachers and allowed them to collaborate, but studies about the implementation of a common vision after solving a PBL are missing in PBL and educational change literature.
REFERENCES


DuFour, R. (2004). What is a" professional learning community"?. *Educational leadership, 61*(8), 6-11.


Appendix A

Interview Questions PBL.

1. How did you feel about the PBL when you first learned about it?

2. How did you feel about working with your team? How would you describe your working relationship?

3. In what ways, if any, did working with your team change (mature) from the beginning of the PBL to the end?

4. In what ways, if any, did working with your team on the PBL affect your collaborative relationships?

5. In what ways, if any, did working with your team on the PBL affect the way you see a teacher’s role in school?

6. In what ways, if any, did working through the PBL affect your perceptions of school change?

7. To what extent was your group able to arrive at a common vision for school change?

8. In what ways, if any, did this experience affect your ability to solve real, school-wide problems?

9. As a result of working on the PBL how do you feel about the responsibilities school administrators have?

10. Now that you have completed the PBL, what others feelings do you have about it?

11. What feelings about future change at Arboretum does participating in the PBL process create

12. Any Comments:
Appendix B

PBL Feedback Survey

Directions: For these responses, please consider 5 to be the highest or strongest rating and 1 to be the lowest or weakest. Circle the appropriate choice for each item.

1. To what extent did you find the PBL scenario realistic?
   Great extent 5 4 3 2 1 Little or no extent

2. To what extent has participating in the PBL influenced your thinking about school change?
   Great extent 5 4 3 2 1 Little or no extent

3. To what extent did working on the PBL affect your perceptions of collaborating with others?
   Great extent 5 4 3 2 1 Little or no extent

4. To what extent did the PBL alter your perceptions of teachers’ roles in change?
   Great extent 5 4 3 2 1 Little or no extent

5. To what extent did you feel free to respond to the PBL honestly and candidly?
   Great extent 5 4 3 2 1 Little or no extent

6. To what extent did working on the PBL enable your group to build a common vision for school change?
   Great extent 5 4 3 2 1 Little or no extent

7. To what extent did the PBL experience influence your decision making process?
   Great extent 5 4 3 2 1 Little or no extent

8. To what extent PBL helped you work on deep listening.
   Great extent 5 4 3 2 1 Little or no extent

9. To what extent PBL helped you build on you peers ideas
   Great extent 5 4 3 2 1 Little or no extent

10. To what extent surprising ideas emerge in your discussion.
    Great extent 5 4 3 2 1 Little or no extent
## Appendix C

### PBL Feedback Survey 2

1. To what extent innovative ideas emerge in your discussion.
   - Great extent 5
   - Moderate extent 4
   - Some extent 3
   - Little extent 2
   - Little or no extent 1
   
   Briefly Explain

2. To what extent did the PBL experience influence your group’s decision-making process?
   - Great extent 5
   - Moderate extent 4
   - Some extent 3
   - Little extent 2
   - Little or no extent 1
   
   Briefly Explain

3. To what extent do you believe a PBL experience would benefit all teachers?
   - Great extent 5
   - Moderate extent 4
   - Some extent 3
   - Little extent 2
   - Little or no extent 1
   
   Briefly Explain

4. To what extent has participating in the PBL influenced your thinking about school change?
   - Great extent 5
   - Moderate extent 4
   - Some extent 3
   - Little extent 2
   - Little or no extent 1
   
   Briefly Explain

5. To what extent did working on the PBL enable your group to build a common vision for school change?
   - Great extent 5
   - Moderate extent 4
   - Some extent 3
   - Little extent 2
   - Little or no extent 1
   
   Briefly Explain

6. To what extent did the PBL alter your perceptions of teachers’ roles in school change?
   - Great extent 5
   - Moderate extent 4
   - Some extent 3
   - Little extent 2
   - Little or no extent 1
   
   Briefly Explain

7. To what extent did you feel free to respond to the PBL honestly and candidly?
   - Great extent 5
   - Moderate extent 4
   - Some extent 3
   - Little extent 2
   - Little or no extent 1
   
   Briefly Explain
8. To what extent did you feel the dynamics in your group led to the best possible decisions?
Great extent 5  4  3  2  1 Little or no extent

Briefly Explain

9. To what extent did you feel the relationships in your group change over time?
Great extent 5  4  3  2  1 Little or no extent

Briefly Explain

10. To what extent did you feel better prepared for school change due to working with this PBL?
Great extent 5  4  3  2  1 Little or no extent

Briefly Explain

Please add any comments or suggestions that might help improve this PBL.
Appendix D

Tradition and Growth at Arboretum

A Problem Based Learning for Educational Research.

Developed by
Carlos Esteban Perez – Penn State University
Bernard Badiali – Penn State University

General Instructions

1. This is the suggested procedure for each session.
   a. Read the project and all support documents
   b. Thoroughly discuss the problem in your group
   c. Review and discuss the resources and materials
   d. Discuss the guiding questions and complete the product.
   e. Present oral report
   f. Complete the assessment

2. From your group you should select a leader, a facilitator and a recorder.
   a. Leader: is responsible for organizing the project, accomplishing learning
      objectives and completing the product. What is expected from the leaders is:
      i. Provide initial directions and agenda
      ii. Contribute your ideas as any other member
   b. Facilitator: Keeps the group moving productively. She assures that all voices in
      the group are heard and that everyone in the group participates and shares
      responsibilities for work. The facilitator must insure that the team will be able to
      complete on time.
   c. Recorder: This person must record major ideas and decision reached. At the end
      of each session the recorder should present a summary for the group. Here are
      some recommendations:
      i. Keep record of ideas and who offered them.
      ii. Keep track of decisions.
      iii. Make note of any points of strong agreement or disagreements.
      iv. Record resources referenced by the team.
Introduction

Arboretum is a pre-k – 11th grade school, located in Bogota Colombia, South America. It is a bilingual school. That means that new students are immersed in an English only environment for the first two years. They learn to read and write in English before they do in Spanish. In addition, the school has single gender classrooms, but in all other activities outside the classroom boys and girls are sharing the same space. Currently Arboretum has almost 1600 students, but there was a time when the school population was shrinking, it had an “inverse student pyramid.” They used to have more students in the upper levels than in the lower levels. New applications declined over time for the lower grades. A high volume of applications came for high school.

Those days were the days when the founder and owner passed away and didn’t prepare the next generation to understand how to keep the school thriving. It began to decline in enrollment and in reputation. Fortunately, a new generation of school leaders learned over time how to change the school to respond to the needs of parents and families. The school is thriving once more. But we know that history tends to repeat itself if lessons are not learned.

Now a days the school is a top school in the country, not only because of their results in national tests, but also because universities are allocating scholarships for students graduating from Arboretum, and that is a testament to the efforts of the current administration an how well they have revitalized this school.

The principal of the school knows that it was not a single hand that guided the school to its current success, it was teamwork, and a team that believed in a dream and together with hard work made it a reality. As time passed by, the school developed its own culture and its own standards for quality. But once again school leaders are beginning to question themselves. They wonder if the school’s culture has enough space to meet new teachers needs, new community needs, and new students’ needs. They want the new generation in the school community to be prepared to not only keep the old vision alive, but to create a new vision that will serve the school well into the future.

The Problem

Silvana, Arboretum’s principal, had a demanding day. She met with Alberto’s parents, and explained why Alberto needs to be relocated. Alberto has been struggling with many subjects, specially English. He is in second grade; the class teacher had a meeting with all Alberto’s teachers. She also invited the grade level psychologist and news was not good. After the meeting Silvana got a report stating that it wouldn’t be beneficial for Alberto to stay longer in the school. He has been struggling since first grade and he would do much better in other school
with a less demanding curriculum, especially a monolingual one. This is the third 2nd grade student that needed to be relocated this year. Silvana, the classroom teacher and the psychologist explained the situation to the parents. It was the 7th meeting they had (4 in 1st grade), and the parents agreed with their recommendation. Furthermore, Alberto expressed his relief and he sounded exited about going to a new school.

Silvana called upon first and 2nd grades teachers, the psychologist and the Cervantes Team. Once they were all together, Silvana wanted to know why we 1st and 2nd grades teacher and principal aren’t able to support students that were struggling during these years? She was finishing her question when members of the Cervantes team arrived. Fernanda knew that not everyone had a clear idea of Cervantes team purpose. She shared part of the story:

“Fernanda, a retired 1st grade Spanish teacher and I created the Cervantes team. In a meeting some years ago, Fernanda mentioned how it was possible to sort students who were having some kind of difficulty in learning to read and write in Spanish in the early months of the year. She needed support from special education teachers, psychologists and therapists to bring up to speed with the curriculum. In previous years, students who showed any difficulty in learning to read and write in Spanish usually ended up being relocated to other non-bilingual schools”.

As the meeting continued Silvana questioned the Cervantes team about why they have lost their efficiency in helping students. The team’s only answer was the lack of support from the Spanish Department and Miguel’s 1st grade Spanish teacher. They argued that Miguel did not have time to work with them, and he did not open space for their weekly meetings. In addition they have talked to Miguel, but he is a new teacher. He is just filling some “big shoes” and it is going to take a while to do it. Furthermore Miguel explained that he did not know how to identify students that needed Cervantes team support. At the end of the meeting, 1st, 2nd grade teachers, and the Cervantes team decided to work together to understand how to help Miguel sort those students in need. Finally Silvana met with Miguel and Felipe, the Spanish director, and asked them to work together to sort things out as soon as possible. They would have any resources available for such task.

At the end of the school year, one 1st grade student needed to be relocated. The Cervantes team and the teachers could not support her and there was nothing that Silvana could do. One thing was clear to Silvana, Fernanda knew how to sort these students and she left the school two years ago. That wasn’t the only thing that was worrying Silvana at that point, so she called a meeting with all content area leaders, and shared what is happening in 1st and 2nd grade. During the meeting she questioned what would happen if Directors left the school in a short run. Most
Directors have been in the school for 20 years, and have been changing the school side by side with Silvana. Among the Directors, one voice was heard that stated that new teachers should find their own way as they did when they first began teaching. Others stated that they could lose what they have done, if new teachers did not learn from them. As that argument was presented other directors reply “but who has time?” There were some laughers afterwards.

Silvana knows how much it has been hurting her 1st and 2nd grade students since Fernanda’s retirement. Fernanda was the heart of Cervantes team. She was the one able to identify students that needed support early in the year, and such knowledge is gone with her. There was no structure in place that could help the school preserve such knowledge and now new teachers were left to discover it all over again. Upon this reflection, Silvana contacted Fernanda and convinced her to come back and work for two more years having one day off each week. It was a tough deal but Silvana did not want students to suffer. After assuring that Fernanda was coming back to the school, Silvana questioned herself about how much knowledge lies within each teacher. She wondered if that knowledge is public or it just belongs to each one of them individually. Furthermore, she worried about other retirements that would soon occur. She knows that some of her teachers are near retirement.

Silvana cares for the school, her students and her teachers. She is concerned that all of their hard work to move forward the school could no be lost because of the privacy of knowledge and experience. Haunted by that idea, Silvana prepared the list of teachers and the years they have left before they pension.

This is the list she came up with:

<table>
<thead>
<tr>
<th>Name</th>
<th>Area</th>
<th>Years to pension.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alejandro</td>
<td>Natural Science</td>
<td>2</td>
</tr>
<tr>
<td>Antonia</td>
<td>Social Science</td>
<td>4</td>
</tr>
<tr>
<td>Camila</td>
<td>Math</td>
<td>3</td>
</tr>
<tr>
<td>Martín</td>
<td>Philosophy</td>
<td>8</td>
</tr>
<tr>
<td>Gabriela</td>
<td>Students</td>
<td>1</td>
</tr>
<tr>
<td>Felipe</td>
<td>Spanish</td>
<td>2</td>
</tr>
<tr>
<td>Simona</td>
<td>Art</td>
<td>0</td>
</tr>
<tr>
<td>Andrei</td>
<td>Pre-School (pre-k and Kinder)</td>
<td>8</td>
</tr>
<tr>
<td>Silvana</td>
<td>Principal</td>
<td>4</td>
</tr>
</tbody>
</table>
Silvana reviewed with the financial director the resources Arboretum has for professional development. At this point the school has spent 48% of its approved budget for professional development. Almost 80% has been allocated in tuition in different universities for teacher’s masters in different areas. There has been 2 workshops, one in ethical decision-making and the second in teacher inquiry.

In addition the school has two types of meetings in which professional development must be addressed. The first one is a grade level meeting, where all teachers from the same level meet and work in different topics concerning the level in which they teach. The second meeting is a content area meeting, where all teachers of the same area meet and discuses curriculum issues, lesson planning, among others. Both meetings are built into each Director and teacher’s schedule.

As Silvana did a follow up of such meetings, she found that all the time was allocated to discuss disciplinary issues. The Directors usually gather information about each situation and discuses this issues in their meeting with Silvana and the other Directors. There was no time allocation for teacher inquiry or other professional development.

Silvana followed these meetings for a month. After she gathered enough data she “invited” all Directors for a meeting on Saturday morning and required them to invite at least two teachers from their content area team. Silvana knows her team and she knew that every Director would only invite those teachers that excel among their staff. She was counting on that, she wanted to have those teachers that were the most qualified for that meeting.

As the meeting started, Silvana asked every person to fill out an evaluation form. It was an open-ended evaluation. The first question asked each participant to describe his or her professional development program. The second question focused on what each one learned from their professional development experience in the school. The third question addressed implementation or how are teachers using what they learned. The forth question of the evaluation asked each teacher for student learning outcomes, has the teacher’s professional development program enhanced students performance overtime. The final question asked each one if they have been able to share with any peer or Director the outcomes of the professional development they have been working on.
As everyone answered the evaluation, there was an uncomfortable sensation in the room. Silvana set up random triads and had them share their answers. Finally each triad shared their answers with everyone else.

The Directors and Silvana worked on a final report that was explained in the next board meeting. Here are the main points:

1. Arboretum’s professional development program focus mainly in university studies. Teachers present their acceptance letter in a Master program and a letter where they state the need for financial support. The schools offers between a 40% up to 60% of financial support but teachers must agree to stay in the school for 2 year after their graduation.
   a. Teachers are not able to share what they learn in their studies, in some degree it becomes private, just because there is no space for sharing to happen.

2. The amount of time allocated for professional development its been replaced with weekly issues concerning students performance and students discipline.

3. Directors have no clear role in their responsibility of professional development programs for their teachers.
   a. Directors stated that they do not have time or knowledge how to support professional development programs for teachers.
   b. As retention level for new teachers is lower than 2-3 years, why should Directors professional development programs of these teachers when they can focus on those who are willing to stay in the school?
   c. As we (Directors and Silvana) evaluate our teachers, how can we support their professional development?

4. New teachers usually have new ideas of teaching and schooling that Directors trend to think goes against Arboretum’s current culture. This has become a common issue among all areas, but up to now Directors had been able to handle the situation.

5. Teachers and Directors agreed that the school has become a trampoline for novice teachers, whom are looking for better salaries in other schools. Directors stated “this generation of teachers are not like we used to be, they just want to work for a few years in Arboretum, and then jump to other schools that value this experience”.


Your task

Silvana met with the school board to share her thoughts about the school’s Directors and they’re near retirement. Furthermore, she explained how valuable is the knowledge this team has acquired over the years. Arboretum’s board has allocated emergency resources to address this issue. For the school, it is clear that there is a need to focus on professional development. She hopes to change the school’s culture into a true learning community. Arboretum has hired you to help them in addressing their dilemma. In addition, Silvana has information about the school and the Directors. This information will allow you to see a wider picture of the school. Finally, Silvana will be available to answer any questions. Please contact her through Esteban’s Email. Furthermore, if you need to contact any teacher, Silvana would do as much as she can to make her team reachable to you. Silvana and the Board of Arboretum is looking forward to your plan for the kind of professional development that will insure that the wisdom of the Directors continues to guide the school into the future.

Arboretum Staff

Alejandro (Natural Sciences)

He has been teaching for over 20 years at the school. 15 years ago he took possession as Area Director of Science. Over that period of time he has become a key player in the process of academic decision-making at school. He has become a school leader and gained his leadership thanks to his relation with Camila, Math Director. The whole team of teachers values his opinion and many see him as a leader within the school.

In the last years Alejandro has expressed a desire to withdraw from school. His vision of education and the way in which he exercised does not need to change. For him, the idea of change implies a regression in what the school had succeeded in this past 10 years. They found a path, a successful one and that is what the school should keep working on.

Antonia (Social Sciences)

It humanistic sensitivity, combine creativity in solving problems that involve change has offer her a direct door to the principal. Her latest achievement was the publication of her master's thesis which cautions colleges about their responsibility as educational institutions, making induction programs for new teachers focused on learning and professional development of future generations of teachers. Antonia has become a school champion, fighting for a change in the induction process that is currently in place. It has been at least 10 years and this program hasn’t change, at the most each director adapts to its content knowledge the program.
This type of sensitivity to these issues has been evident since his appointment as head of the area's social area, which it was very early in Antonia’s career. At that point Camila opposition to Antonia’s appointment as Director was well known in all the school. Finally Antonia’s university has come to Antonia searching for a school that is willing to work as a pre-service site for their future teachers graduates.

Camila (Mathematics):

Since Camila was appointed as Math Director, she focused on how to support and endorse her math team in their professional development. She has been able to create a team that works together and her team sees her as an outstanding leader. As a result of such work, the math department is recognized in the school by its collegiality and cohesion. In addition some teachers feel that Camila segregates other departments from professional development opportunities.

Camila’s work has been purely intuitive and developed according to the needs of individual teachers; the idea of a structured and institutional plan reminds her of limits. Finally Camila has always been outspoken about Antonia and her professional closeness with Silvana. Camila knows that Antonia is able to influence the decision making process in the school, avoiding the entire bureaucratic path that everyone else has to follow.

Martin (Philosophy):

Martin’s process began as a teacher in school but in a twist of circumstances he was appointed as temporary philosophy Director. His great performance in this position allowed Silvana to give Martin an opportunity to become the new Philosophy Director. He has become the person that has always an alternative perspective, and he is critical the school position in any decision. His overall view of the school, in the interest of an excellent education for students has become an internal consultant in decision-making. A level of frustration has grown over the past year as constantly requested a time to regroup and assess all the initiatives that have school at this time.

Martin lost one promising teacher and it has been one of his profound deceptions of his current position. He points out that the lack of time and funding from the administration didn’t let him support his and unfortunately he left and there was nothing that Martin could do to retain him.
Gabriela (Student Director):

Gabriela has fulfilled her professional career with excellence as Director of Students. Her long career in school has allowed her to see changes that guide the school to its current situation. Her concern is that teachers are not fully aligned in academic, institutional and disciplinary processes at school. This has created a dissonance between the positions with veteran teachers, and with teachers who have a few years in school. She doesn’t have enough time to acculturate new teachers, and decision-making process is affected because new teachers are not following the school’s culture and guidelines. Gabriela states that Content Directors are not working an in holistic induction program, and decision concerning students interests had been misleading for the community.

Felipe (Spanish):

He has been teaching for 23 years in the school. He found in Arboretum a space to teach Spanish but also he was able to introduce Art History in the curriculum, which was one of his greatest accomplishments from his point of view. Felipe always reviews any school document that is going to be sent to parents or other teachers, he is the principal’s second hand. This last year Felipe enrolled with one Spanish teacher in a Masters degree program. For him it has been a unique experience to be able to work with one of his teachers outside of his routine, he has found spaces for reflection that weren’t there, he has been able to create a unique relation with his teacher, and now he is working on how to transfer such experience to all his teams. He has always been characterized for his need of new knowledge as a teacher, as a director, as a person. New initiatives are remarkable because he always sees them as new learning opportunities.

Simona (Art):

Simona is part of the old, old generation of teachers in this school. She has been around since ever, as some peers reflect. Her passion for dance, her affinity to art, and her leadership made her for more than 30 years the best choice for art director. She got her pension 2 years ago, but she keeps working in the school, and there was no change in her responsibilities. In her view there is no one that can do what she does, her shoes are to big for any other person.

Simona is also Silvana’s close friend, they saw the school grow together, and she trusts Silvana unconditionally, she followed her during the curriculum change, she complained how her time embedded in the school’s curriculum was reduced, but her after classes became a success among the students. Silvana suggested before her retirement year that she could hire her niece as
a teacher in her department. Silvana has taken Olivia under her wing, but she always states that she has so much to learn.

Andrei (Pre-School):

He joined the school 4 years ago, when the new pre-school was ready. He used to be a vice principal in a small private school. When he applied to his current position he was looking forward to learn as much as he could about the school and how to make a school a successful one. His astonishing resume spoke highly of him and his performance in the school. Pre-School teachers had been complaining to Silvana about Andrei leadership, he doesn’t want any type of support from outside the pre-school, it seems that he feels they are an independent body.

Silvana (Principal):

Silvana has been the principal of the school for the last 30 years. She also graduated from the school when her aunt was running it. When she became teachers, her aunt was old and the school lost its previous glory. She was responsible for leading the school to its current success. She was able to gather a team of professionals to work with her towards a common goal. She has been recognized as a person who does not fear change, she is a changing agent. Silvana changed the school from a monolingual to a bilingual school in 1994, and in 1997 the school opened its door to boys as an answer to those parents looking to give the same opportunities of schools that their girls had. But time has taken a toll on Silvana and that energy that used to be her common denominator is fading.

Her passion of excellence is recognized by all her staff and with a sharing decision model implemented long ago, she found that every Director has a voice in all educational decisions. As the school grew her time to work on projects reduce, administrative work and daily tasks take most of her time. She always allocates time for the new building project that would be ready in 2015-2016.

Silvana reports to the school board, as a private school Arboretum has to be a profitable school and the board must approve any new program for the school. Silvana has become proficient in selling new programs to the board. She did it with IB or Mandarin.

Sandra (Vice Principal)

Sandra was Silvana’s right hand for a long time. She helped the school become a bilingual one. She was the one that found the school’s partnership with a university. This partnership focused on helping Arboretum redesign its curriculum to a bilingual one, train its teachers to
teach English as a second language and implemented student exchange program. The school also was able to send their students to study English in the university during the summer. This program is still in place, but 10 years ago, the university stopped sending their student teachers to Arboretum for security issues.

Juan (English)

Juan used to teach at the school several years ago. He had the opportunity to teach in a public school abroad, and it was one of his best decisions. He came back because Sandra offered him the English Director Position. In addition Juan is one of those teachers whom benefited from the school university partnership and did his masters in teaching English as a second language.

Pablo (IB)

Pablo has been working in the school for 23 years. In that time he was preparing himself to become the next English Director, but the IB position came available and he took it. It has been a professional challenge but he has learn, he has become a key piece to the school’s educational program. As IB is implemented in the last 2 or 3 years of schooling, the curriculum had to be restructured to find the space needed for IB. It was a huge task, with teachers against and onboard, but the first IB graduates came 2 years ago. It has been a success, but working with teachers and students in classrooms is something that he misses. In addition he is overwhelmed by the IB implementation, he think he lost friends in the process and he argues that IB needs more time before something new comes to the school.

Fernanda (Spanish Teacher)

Fernando worked for 27 years in the school. During this time she saw a transformation from a small school into a leading one in the country. Silvana knew that such change was not as easy for Fernanda. She had been a kindergarten teacher for 15 years, there she taught girls how to read and write in Spanish among other things. Thanks to Silvana work, Fernanda is working in the school for 2 more years.
Guidelines for the product

Adaptation of a Supervisor’s Dilemma: Planning for Change at Unison Elementary School.

1. Prepare a 5 year action plan (5 - 8 pages) that embodies your team solution and implementation to the problem at Arboretum. Please remember that this plan will be shared with Arboretum advisors. The plan should include:
   a. Definition of the problem, if you find there are more than one problem, please prioritize those that you choose to address and explain.
   b. A plan for addressing important components of the problem(s). The plan should include sample activities, the sequence which you intend to proceed with them, and your rationale for the selection sequence.
   c. Your strategy for gaining the support of the key actors and for overcoming the potential obstacles you will face in implementing your plan.

This document should present the major dimensions of your plan for solving the problem at Arboretum. Note, however, that the board is interested in both formal and informal aspects of the strategy that you have developed for addressing the problem. It recognizes that plan must be adapted to various considerations, but it is interested in seeing just what you have in mind for Arboretums future.

2. Prepare a 15 -20 minute presentation in which you describe your plan and discuss a solution to the problem. One member of the team will be selected to give the presentation. The team is responsible for assisting in the defense of its proposals.

3. Prepare an essay (2 pages, double space) that reflects on your team’s decision. What decisions shaped your plan, which decisions would you change?

4. Create a current list of sources from which you have drawn information that helped you address the problem.
### Background Information

#### History in a table

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1945</td>
<td>Founded as Peace Colombian School (Private) Pre-k To 11th grade. 11th grade is the same as 12th grade in USA, the difference is that the school has a Pre-k before kindergarten.</td>
</tr>
<tr>
<td>1956</td>
<td>The first batch of students graduated in. From the very beginning the school has been renowned for the faith it has in the benefits of education and its ability to transform reality.</td>
</tr>
<tr>
<td>1994</td>
<td>The school changed its name to Arboretum and established a partnership agreement with and international university in USA. The school found in this university the support an endorsement to learn how to teach English as a second language. This partnership agreement has consolidated the bilingual program and marked the profile of Arboretum’s students as citizens of Colombia and of the world.</td>
</tr>
<tr>
<td>1997</td>
<td>Arboretum’s female-based educational system became known as an innovative model for coeducation with a gender perspective, which consists in designing gender-based pedagogic strategies. Boys and girls study in separate classrooms, but share the rest of the common areas for cultural, sports and social events enabling them to reach levels of excellence in different fields in a happy environment where they build their own life plans.</td>
</tr>
<tr>
<td>2004</td>
<td>First Bilingual Class of Graduates. Fifth place in State Exams (ICFES) in Bogota</td>
</tr>
<tr>
<td>2008</td>
<td>First place in State Exams at national level.</td>
</tr>
<tr>
<td>2009</td>
<td>First Mixed Class of Graduates. Third place in State Exams at national level and second place in State Exams in Bogota. Start of Mandarin as a third language program.</td>
</tr>
<tr>
<td>2010</td>
<td>Start IB (International Baccalaureate)</td>
</tr>
<tr>
<td>2011</td>
<td>Mandarin program implementation</td>
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<tr>
<td>2012</td>
<td>First 7th grade mandarin exchange to China.</td>
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<td>2013</td>
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## School's Statistics

<table>
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<tr>
<th>Year</th>
<th>ICFES/Pruebas Saber (SAT) Colombian Ranking</th>
<th>Students</th>
<th>Graduation Rate</th>
<th>Teachers</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Girls</td>
<td>Boys</td>
<td>Total</td>
</tr>
<tr>
<td>1993</td>
<td>-</td>
<td>659</td>
<td>-</td>
<td>659</td>
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<tr>
<td>1994</td>
<td>-</td>
<td>698</td>
<td>-</td>
<td>698</td>
</tr>
<tr>
<td>1994-1995</td>
<td>-</td>
<td>743</td>
<td>-</td>
<td>743</td>
</tr>
<tr>
<td>1995-1996</td>
<td>-</td>
<td>749</td>
<td>-</td>
<td>749</td>
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<td>1996-1997</td>
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<td>1997-1998</td>
<td>-</td>
<td>840</td>
<td>120</td>
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<tr>
<td>2005-2006</td>
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<td>2006-2007</td>
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<td>1265</td>
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<tr>
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<td>2009-2010</td>
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<td>829</td>
<td>539</td>
<td>1368</td>
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<tr>
<td>2010-2011</td>
<td>12</td>
<td>894</td>
<td>622</td>
<td>1516</td>
</tr>
<tr>
<td>2011-2012</td>
<td>3</td>
<td>903</td>
<td>658</td>
<td>1561</td>
</tr>
<tr>
<td>2012-2013</td>
<td>3</td>
<td>883</td>
<td>689</td>
<td>1572</td>
</tr>
</tbody>
</table>

* This number includes all students that retired from the school for any reason. The main factors are: Academic, Parents work transfer to different city, coexistente (disciplinary), economic, among others. Please see the table Reasons why students left the school in 2012-2013.
Appendix E

A Supervisor's Dilemma: Planning for Change at Unison Elementary School

This problem is an adaptation of The Principal's Blues. It is based on a methodology developed by Professor Edwin Bridges from Stanford University called Problem-Based Learning. This problem is the culminating exercise for EDL 645. It is designed to synthesize the information you have acquired regarding supervision, adult development, school change, staff development and group interaction. Use what you have learned in class thus far, your textbook and any other you can find to arrive at a viable solution to the problem.
VITA

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Education

**Doctor of Philosophy Curriculum and Instruction**

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