

Can Professional Development Increase Successful Project-Based Learning Implementation?

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Abstract

In an effort to make St. Mary of Carmel Catholic School stand out amongst its growing competition in West Dallas, a decision was made to pursue Project Based Learning (PBL) as an instructional strategy to prepare students for the 21st Century. This research seeks to assess the effectiveness of teacher preparation and professional development to equip staff for the planning and implementation of Project Based Learning. Using a pre-, mid-, and post-survey design, this research assessed teachers' knowledge of and perceived capability to plan/implement PBL in their own classroom before, during and after sustained professional development focused on PBL. All 14 instructional staff members at St. Mary of Carmel participated in the survey throughout the first semester of the year. While the study found some increase in teacher knowledge and perceived ability to implement PBL, it highlighted even more the diverse needs of teachers in the process of learning a new pedagogical method. Teachers cannot all be expected to learn and grow based on a few whole group development sessions; this research highlights the need for new and innovative professional development strategies that are paired with school wide systematic changes. Specific information from the staff surveys detailed how professional development and school schedule can be adjusted to support teachers in the process of PBL implementation over the next year. These recommendations will be tried next year and evaluated for continued success/areas of improvement.

Introduction

At table one, two boys reference their cardboard model and 2D drawings to begin constructing their final birdhouse with pieces of wood. At table two, three girls are drawing circles on their water bottles to indicate where they need Ms. Kramer to cut holes and transform the water bottles into bird feeders. At the iPad table, two girls are testing how much water their birdbaths can hold to be sure it is enough. On the carpet, a small group of students is constructing another birdbath with planters and saucers. At the kidney table, a line of students wait for Ms. Kramer to hot glue their pieces of wood together. When the principal walks in, it takes a few minutes to find Ms. Kramer amid all the work. Instead she decides to ask a few students what they are doing. "Building a better habitat for birds!" was the resounding answer from several students. Fred went on to explain that the birds on our school campus had nowhere to live that would give them all the things they need to survive: shelter, food, and water. This class had undertaken the task of building bird habitats in response to the question "How can we make SMC a better habitat?" And this all occurred in a Kindergarten classroom as a result of Project Based Learning, an effort to teach students in a way that combines curricular standards and 21st Century skills while engaging students in real world, constructive learning.

How can we create a learning environment that prepares our students to excel as Catholic stewards in the 21st Century? At St. Mary of Carmel (SMC), we believe the answer is Project Based Learning. As an inner-city Catholic school, we are consistently striving to be sure that we are giving our students the best education

possible. With a population of students that are 98% Hispanic, many of whom are English Language Learners, and 70% of whom receive free and reduced price meals, our students come to school already facing a number of barriers and disadvantages. Each year, our standardized testing scores reveal that our students struggle to compete with their peers. In October 2012 on the Iowa Test of Basic Skills Core total, our Kindergarten Class scored in the 39th National Percentile Rank while our 8th Grade class scored in the 57th. Similarly, our 1st and 2nd grade classes scored in the 34th and 26th National Percentile Rank respectively on the Math Total while scoring in the 65th and 32nd percentile on the Reading Total. Looking specifically at Problem Solving and Data Interpretation, a key critical thinking skill, our 8th graders scored only in the 58th National Percentile and 7th graders in the 47th percentile. It is evident that our students are being outperformed nationally, a trend we wish to break. While we have tried new vocabulary programs, new textbook series in social studies and math, and hands-on science kits, it is evident that in isolation these attempts have not bolstered student achievement in the ways we had hoped. We have decided that Project Based Learning (PBL) can be the answer that sets our school apart, but the challenge now is to ensure that we train teachers and provide them with the proper professional development and support to ensure the success of PBL implementation.

With the growing presence of charter schools in Dallas (e.g., Pegasus Charter School, A.W Brown-Fellowship Charter School, Harmony Science Academy, Dallas Can Academy, Golden Rule Charter School, Focus Academy, Williams Preparatory), and other Catholic schools located within close proximity to St. Mary of Carmel (i.e., St. Cecilia, St. Elizabeth of Hungary) it is necessary for us to stand out by excelling academically. With the presence of PBL instruction, our students can develop 21st Century skills while mastering key

curriculum standards, therefore creating a higher standard of academics at St. Mary of Carmel. However, the implementation of PBL is a learning process. Teachers simply cannot be mandated to teach in an entirely new fashion and plan in ways unfamiliar to them. Development, training, and support for Project Based Learning must be implemented in order to help teachers achieve success with PBL. Thus, this action research is crucial in determining what kind of development, training, and support are necessary and most effective in aiding teachers with PBL implementation. As we embark on the journey of implementing Project Based Learning at SMC, this action research will assess teacher preparedness and how to effectively assist teachers in the process of learning PBL. This project can serve as a field guide or case example for other schools as they look to develop Project Based Learning as an instructional strategy.

Purpose Statement

The purpose of this action research project was to assess the effectiveness of teacher preparation and professional development to equip staff for the planning and implementation of Project Based Learning as well as to determine what support teachers feel is necessary to ensure successful Project Based Learning implementation.

Research Questions

The major research questions addressed in this action research project include:

1. How does professional development change teachers' level of comfort with and motivation for PBL?
2. How effective are focused professional development efforts in preparing teachers to plan and implement PBL?
3. From a teacher's perspective, what continued development and training are necessary to have success in planning and implementing PBL?

4. What support and structures are necessary from an administrative level to make the planning and implementation of PBL easier for teachers?

Literature Review

Although PBL is currently a hot topic of discussion in the field of education, it is certainly not a new and novel idea. A long history points to using project based strategies in education, especially in the fields of science and mathematics. PBL is a well-studied and documented strategy throughout all of education. This literature review will examine what PBL is and its instructional value in order to illustrate why PBL was chosen as the breakthrough strategy at St. Mary of Carmel. Despite its value, PBL is not an easy strategy to implement effectively as it introduces a multitude of challenges for both teachers and students. Thus the literature review discusses the challenges teachers face as we work to identify how to help teachers cope with those challenges. Lastly, the literature delves into the knowledge base of current recommendations and studies of teacher development and preparation for implementation of PBL.

What is PBL? Why choose PBL as an instructional strategy? Project Based Learning is a learning strategy that is distinct from traditional classroom approaches for a number of reasons. PBL is “an instructional (and curricular) learner-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem” (Savery, 2006, p. 9). Blumenfeld and her colleagues described the unique qualities of Project Based Learning:

Project-based learning also places students in realistic, contextualized problem-solving environments. In so doing, projects can serve to build bridges between phenomena in the classroom and real-life experiences; the

questions and answers that arise in their daily enterprise are given value and are shown to be open to systematic inquiry. Hence, project-based education requires active engagement of students’ effort over an extended period of time.

Project-based learning also promotes links among subject matter disciplines and presents an expanded, rather than narrow, view of subject matter. Finally, projects are adaptable to different types of learners and learning situations.

(Blumenfeld, Soloway, Marx, Krajcik, Guzfial, & Palincsar, 1991, p. 372)

To most teachers, finding a way to engage students in authentic learning that builds on prior knowledge and is naturally adapted to different learning styles and abilities is an elusive quest. PBL combines all knowledge of best practices in education into one learning strategy.

While debate continues, the effectiveness of PBL has proven itself time and time again in studies throughout the past 30 years. Acknowledged for its value in student engagement and building collaboration and communication skills, PBL has a positive impact on students’ long-term retention and application of content knowledge (Ravitz, 2009). Not only does PBL “empower students with intellectual responsibility” (Barron, Schwartz, Vye, Moore, Petrosino, Zech, & Bransford, 1998, p. 295), it changes the goal of learning from rote memorization to higher level synthesis and application of knowledge (Strobel & van Barneveld, 2009). The Center of Excellence in Leadership of Learning (CELL) at the University of Indianapolis asserts that PBL not only impacts learning of content knowledge, it also produces higher ability to demonstrate and apply content knowledge. It also leads to higher levels of student engagement, improved critical thinking and problem-solving skills, and superior collaborative skills (CELL, 2009). For example, one study on PBL found that high-ability students increased their use of critical-thinking skills by 76% while low-ability students increased their use of critical-thinking skills by an

astonishing 446% (Horan, Lavaroni, & Beldon, 1996). PBL is a learning strategy that has proven effective in bolstering student achievement and could prove to do the same for students at St. Mary of Carmel.

Challenges and difficulties for teachers. Despite a wealth of benefits for students' learning and achievement, Project Based Learning is not a strategy that most teachers are trained in and prepared to implement. "A major hurdle in implementing project-based curricula is that they require simultaneous changes in curriculum, instruction, and assessment practices – changes that are often foreign to the students as well as the teachers" (Barron et al., 1998, p. 271). Teachers attempting to implement PBL have identified that their greatest challenges can be found in classroom management, support of independent student learning, releasing control, time management, use of technology, and adjusting assessments (Marx, Blumenfeld, Krajcik, & Soloway, 1997). When a teacher first implements PBL it is difficult, near impossible, to predict how students will react and "first efforts are also restricted by a limited vision of what the classroom might look like, how a project unfolds over time, and a lack of exposure to examples of instruction of this type" (Marx et al., 1997, p. 348). Even as teachers make multiple attempts at implementation, it is difficult to reimagine that a productive classroom no longer means it must be quiet. Learning does not only take place by listening and following the directions of the teacher. "In project-based instruction, these issues become more problematic because of the ambiguity of project-based learning, and the likelihood that numerous activities will occur simultaneously, therefore changing classroom management routines and participant structures" (Blumenfeld et al., 1991, p. 381). A classroom enacting PBL will certainly look and sound much different than a traditional classroom, a realization many teachers and administrators have difficulty understanding and investing in.

Not only do teachers need to adapt to the changing classroom environment but as students' roles change, so does that of the teacher. Many teachers have identified that they "struggled to redefine their role in the classroom by moving from expert and authority figure to facilitator" (Bradley-Levine, Berghoff, Seybold, Sever, Blackwell, Smiley, 2010, p. 17). However, it doesn't just end there... "the challenge teachers face...requires them not only to reformulate the structure of their classroom, but also to create alternative assessments" (Bradley-Levine et al., 2010, p. 6). As learning changes from lecture style to project based, simple pen and paper tests no longer suffice to demonstrate student knowledge. Teachers must develop and use rubrics and other assessment methods. In short, despite all of its academic benefits for students, "this type of academic work is difficult for teachers to manage and sustain" (Blumenfeld et al., 1991, p. 383) and it requires systematic development and training to ensure success.

Recommendations for successful PD/Implementation. Acknowledging that the transition to Project Based Learning is a difficult and time consuming process for teachers, it is important to evaluate school wide systems and professional development in order to best prepare and equip teachers for success. Thus "...leading to the conclusion that teachers need professional development, school and district support, and opportunities to collaborate in order to plan and enact PBL effectively" (Bradley-Levine et al., 2010, p. 3). However, traditional professional development, in the form of 1-2 day workshops, has not proven to be a sufficient model for effecting change.

The literature on teacher change is clear— change will not take root and innovation will not be sustained if one adopts traditional top-down models of dissemination that rely on single workshops, distribution of curriculum materials to be used exactly as prepared, and lists of prescribed practices. (Marx et al., 1997, p. 349)

PBL demands a new type of professional development, one that “needs to reflect the fact that teachers, like students, construct understanding; they need to collaborate with others, try things out, reflect on the results, modify their attempts and try again” (Marx et al., 1997, pp. 355-356). It becomes imperative that the professional development itself models the methods it is trying to teach. While teachers are able to learn from the example, it has also proven to be a more effective way to teach the more complex structures of Project Based Learning. More than just changing the delivery method of professional development, the time devoted to “workshops” might need to be reconsidered. “Many teachers identified collaboration as essential to successful PBL implementation and recognized that time to collaborate was an important support structure” (Bradley-Levine et al., 2010, p. 16). Professional development aimed towards successful implementation of PBL needs to take into consideration that teachers need not simply “sit and get” about how to employ PBL; they need collaboration and work time built in to their professional development.

Larger than just one classroom, the success of Project Based Learning truly requires systematic change. However, “the ongoing challenge is to create supportive environments for the teachers who will realize this potential” (Barron et al., p. 307). Principals, administrators, and superintendents need to recognize the challenge and begin to support the efforts and struggles of teachers hoping to prepare their students in non-traditional methods. Despite the many hurdles, Thomas (2000) asserted that “problems with enactment can be effectively facilitated by a supportive school environment that allows teachers to reflect on their practices and to attempt changes in these practices through enactment linked with collaboration and feedback” (p. 25). As Marx and colleagues (1997) pointed out, success relies not just on one teacher, but in recognizing “the importance of contextualizing innovation

and promoting systemic change” (Marx et al., 1997, p. 350). Ultimately, the success of Project Based Learning is not dependent only on one teacher, but on the support of an entire system. Strobel (2009) stressed that “the focus should shift from researching effectiveness of PBL versus traditional learning, and should refocus on studying the differences in effectiveness of support structures to find optimal scaffolding, coaching, and modeling strategies for successful facilitation of PBL” (Strobel & van Barneveld, p. 55). Similarly, Ravitz asserted that more information is needed on teacher preparation and professional development— especially in consideration of how much teachers have been prepared to teach PBL prior to being studied (Ravitz, 2009). With further research on what constitutes effective professional development and support structures for teachers, implementation of Project Based Learning can enjoy greater success and higher levels of sustainability.

Method

The purpose of this action research project was to assess the effectiveness of teacher preparation and professional development to equip staff for the planning and implementation of Project Based Learning. Three surveys were given to assess teachers’ knowledge and understanding of and ability to implement Project Based Learning over time. In between each survey teachers participated in a variety of professional development activities centered on Project Based Learning.

Participants. The participants in this survey were 13 instructional staff members of St. Mary of Carmel Catholic School. Eleven teachers from PreK-8th grade and two teacher’s aides completed the survey. Of the participants, three were male and ten were female. The participants ranged in age from 24 to 65. Ten participants identified as Catholic. Participants ranged from being in their first year of teaching to having more than 35 years of experience as educators.

Five of the participants hold various Master's Degrees in Education.

Survey instruments. An original survey instrument was used to assess teachers' knowledge of and comfort in planning/implementing project based learning. Participants took a baseline survey (see Appendix A) prior to any professional development focused on Project Based Learning, a mid-project survey (see Appendix B) after a highly focused two-day workshop on Project Based Learning, and a final survey (see Appendix C) after continued support and development regarding Project Based Learning. The survey instruments were very similar at all three time points, asking the same Likert Scale questions each time but varying in their open ended questions based on the professional development teachers had experienced. The survey instrument consisted of five open-ended, short answer questions that probed the participants' understanding of Project Based Learning and what would help them to understand it more completely. Also included in the survey instrument was a 5-point Likert scale rating from *I have never heard of this term* (1) to *I feel fully competent in this term* (5), which asked participants to consider their knowledge of key components of Project Based Learning (i.e., 21st Century Skills, an Entry Event, etc.). Lastly, the survey instrument asked participants to assess their comfort level of planning and implementing a Project using a 4-point Likert rating scale.

Design and Procedure. This research employed surveys at three time points to investigate the impact of sustained professional development focused on Project Based Learning on teachers' capabilities and knowledge over time. Three surveys with only slight variations were administered throughout the first semester of the school year. All three times, the survey was administered using SurveyMonkey, an online survey software. Participants were emailed a link to the

survey and given time to complete the survey during staff work time. The first survey was administered during back-to-school professional development days in August 2013, and it took about 15 minutes to complete. Following the survey, teachers attended a two-day intensive PBL workshop delivered by Dr. Thom Markham, a PBL expert and consultant.

The PBL workshop provided teachers with a total of 16 hours of content focused specifically on what Project Based Learning is, how to plan a Project, and ideas for how to implement in the classroom. Dr. Markham provided teachers with Project Planning templates and gave teachers time to begin to develop their own project with his guidance. See Appendix D for a complete schedule of the workshop. Dr. Markham also shared a copy of his book, *PBL Design and Coaching Guide* (2012), as a resource for teachers. At the conclusion of the workshop, participants were once again given a survey to assess the effectiveness of the workshop and to assess their new understandings of and comfort with project based learning.

Lastly, participants were given a survey at the beginning of December 2013 after several staff meetings and professional development days dedicated to developing knowledge of Project Based Learning. Each month, participants attended a Staff Meeting and a half day of professional development that had some element of PBL development included. At each of those meetings, as a staff we held a Critical Friends procedure to evaluate and provide feedback on one another's progress in planning a project. During the Critical Friends procedure, a teacher shares their progress in planning and implementing a project and the rest of the team provides positive feedback and suggestions for improving their project. The development sessions also included a presentation about the 8 Essential Elements of a Project, analysis of the 8 Essential Elements in a Project, how to create/use a Project

Calendar, how to create/use a Teaching and Learning Guide, and a session on rubrics and rubric making. Various online resources and articles were also shared with teachers throughout the 4-month period.

The study relied on a pre-, mid-, and post-test design that allowed for participants' self-assessment of growth over time. The Likert scale questions allowed for direct comparison of participants' knowledge throughout the semester as a result of professional development. The open ended questions allowed for insight into what teachers felt would help them grasp PBL more fully, serving as formative data throughout the study.

Findings

The purpose of this action research project was to examine the effectiveness of PBL focused professional development in preparing teachers to plan and implement Project Based Learning in their own classrooms as well as identify other support/structural changes that teachers felt were imperative to the successful implementation of PBL. Using a pre-, mid-, and post-development survey, this action research asked teachers to identify their comfort with and capability for planning and implementing project based learning. Open-ended responses allowed participants to give feedback on the type of development they received and what else they felt they needed to be successful. The responses from all three surveys were analyzed to determine whether or not focused professional development impacted teachers' knowledge and capabilities over time and what would structural support would be needed for further support.

Descriptive Summary of Survey Data

Primarily, this research sought to determine how effective professional development could be in preparing teachers to plan and implement PBL. Initially, teachers were asked to rank their knowledge and understanding of the terms/concepts 21st

Century Skills, Entry Event, Driving Question, Project Calendar, Teaching and Learning Guide, Authentic Assessment, and Rubric on a scale of 1-5 (1 *meaning they have never heard of it*, 5 *meaning they are fully competent in the term/concept*). On the baseline assessment, question 1 shown in Table 1, a majority of teachers (8 or more) felt somewhat familiar or fully competent in 21st Century Skills, a Driving Question, A Project Calendar, A Teaching and Learning Guide, and Rubrics. Meanwhile, An Entry Event and Authentic Project Assessment were more foreign concepts to teachers. Also, at least two teachers responded "I feel fully competent in this concept" for each topic. Despite the knowledge base demonstrated in the survey, when asked if they felt comfortable/capable of planning and implement projects, the mean score (on a scale of 1-5, 1 being *not at all*, 5 being *most definitely*) was only 2.43 and 2.86 respectively (see Table 2). The initial survey, shown in Tables 1 and 2, demonstrated that teachers (with the exception of a few outliers) had a basic understanding what PBL is and its basic concepts but that we needed to focus on how to do PBL, specifically how to plan and implement projects in our own classrooms.

Comparing Survey Responses over Time

In comparing the first and second surveys, staff knowledge and understanding of Project-Based Learning and its planning/implementation was on the rise. Despite the first survey showing a strong base of knowledge, the second survey showed that after two days of direct workshop instruction they felt much more familiar with and competent in the key elements of PBL. As evidenced in Table 3, on question number one of the second survey, zero participants responded with a 1 or 2 meaning *I have never heard of this term* and *I have heard of this but I am not sure what it means* respectively. The mean of participant responses increased for every term/concept of question one, most notably for the Entry Event concept, which rose

from 2.36 to 4.46. Even more encouraging was the mirrored increase in teachers' perceived comfort with and capability of planning and implementing a PBL project of their own. On the second question of survey number two, again zero participants recorded feeling *not at all* prepared to plan and implement PBL. The average response rose from 2.43 to 3.54 for planning and from 2.86 to 3.62 for implementing PBL (see Table 4).

Despite the encouraging increases in teachers' knowledge and capabilities, the open ended response questions on the survey reveal that while teachers' knowledge of and comfort with PBL may have been on the rise, it would take much more continued development and exposure to fully prepare them for the planning and implementation of Project Based Learning in their own classroom. Many participants suggested observing other schools or seeing more examples of PBL in action as a method for development that would be most helpful. Another frequent suggestion was to work in groups/teams to develop their first project so that they could become more familiar with the process while receiving help and support. Overwhelmingly, teachers reported wanting more time to plan and more exposure to PBL in other classrooms before proceeding with their own implementation.

The final survey of this action research project revealed a drop in teachers' understandings and perceived capabilities to implement PBL. While the second survey had no participants responding with a 1 or 2 meaning *I have never heard of this term* and *I have heard of this but I am not sure what it means* respectively the third survey had one person respond with a 1 on 4 separate categories and 1 person (or more) respond with a 2 on 4 separate categories (see Table 5). The average response when ranking understanding of key PBL terms fell for every term, and 'Using Rubrics' fell even below the mean response from the first survey in August. Showing the mean response for each term/concept over time,

Table 8 illustrates that despite a spike on the second survey, the final survey places teacher understanding of key concepts lower than the second survey. Similarly, teachers' perceived comfort with and ability to plan and implement a project fell as well. As Table 9 shows, while the mean on the second survey was 3.54 for planning and 3.62 for implementing a project, the third survey means fell to 3.21 and 3.43 respectively.

Short answer responses on the third survey reflected a wide array of opinions. While many listed that the continued professional development between August and December was helpful, some reported it was too rushed or repetitive. One replied "Yes, it was good to get more and more reinforcement" while another said "I do not consider our follow-up sessions extremely effective because it feels as though we have been presented with the same information in various different ways." Others reported that while the activities were helpful in developing background knowledge, they were not enough to truly empower teachers and demonstrate to them how to take the next step in planning and implementation—"it is still very confusing to me; the more I can learn the better I can be" one participant commented on the final survey. A common request was the ability to plan a project on a team or to have the opportunity to observe/work with teachers who are currently implementing PBL in their classrooms. However, despite a decrease on question number 2 between the second and third survey, this perceived comfort with and ability to plan and implement a project does represent a fairly significant increase from the beginning of the year.

A single-factor ANOVA was run for each part of the first two questions of the survey to analyze the change in responses over time (see Table 7). The analysis of variance indicated that over the course of the study there was a statistically significant change in teachers' knowledge and understanding of the essential elements of Project Based

Learning. The essential elements demonstrating significant change over time were: 21st Century Skills, $F(2, 38) = 4.06, p < .05$; Entry Event, $F(2, 38) = 13.71, p < .05$; Driving Question, $F(2, 38) = 6.10, p < .05$; and Project Calendar, $F(2, 38) = 4.89, p < .05$. Neither of the questions reflecting teachers' comfort/capability to plan and implement a PBL project in their classroom showed significant difference over time.

Discussion and Extension

This action research was designed to determine the impact of continued professional development on teachers' ability to plan and implement Project Based Learning. An original survey instrument was given to teachers three times over the course of four months to assess their knowledge of and capacity to plan and implement PBL. Analysis of the survey data showed in initial jump in teacher knowledge and perceived capability but a lack of continued improvement throughout the school year. However, teacher knowledge of and perceived capability to plan/implement PBL showed some improvement indicating that perhaps over time more growth could be seen.

Discussion of Major Findings

The original survey instruments used in this action research project demonstrated a quite unexpected trend in teachers' understanding of and capability to plan and implement Project Based Learning over time. Teachers started with a higher knowledge base than expected and showed tremendous gains on the second survey. However, while teachers demonstrated an overall increase in their perceived comfort with and ability to plan and implement PBL, on average, their knowledge of the key concepts and terms associated with PBL either decreased or grew very little over time.

The second survey showed a spike in knowledge and understanding of PBL essential concepts and in perceived ability to

plan and implement a project. This survey was delivered the day after an intense two-day PBL workshop led by Dr. Thom Markham. Dr. Markham provided teachers with a framework but largely gave them a lot of time to work individually or with groups on the planning of their project. Throughout the workshop, Dr. Markham also worked extensively with each individual to develop their project and ask any questions that they might have. It seems like this individual attention and work time led to an inflated sense of understanding and comfort with PBL. As teachers returned to a regular classroom setting after the beginning of the year in-service, it seems as if there was less time to devote to PBL and more questions arose without a coach there to assist. Despite 30 minutes to 1 hour being devoted to continued PBL development over the next few months, each teacher had different questions and struggles they were grappling with that one group session could not possibly address.

Application of Findings

This action research has revealed that teachers are very much like their students—varied; each with different learning styles, paces, and needs. The individual attention and specific focus of a 2-day intensive workshop can be very effective in delivering content material but, as many experts advocate, it does not suffice in changing teachers' efficacy or methodology. Guided by Marx's statement that "the literature on teacher change is clear- change will not take root and innovation will not be sustained if one adopts traditional top-down models of dissemination" (1997, p. 349), this action research project tried to provide continuous follow-up development to support a workshop, but did not succeed in finding a balance that sustained and motivated teachers. While each teacher grappled with different questions and hurdles to individual implementation, a whole group review session, PowerPoint, or planning activity did nothing to support those individual teachers. Despite initial teacher growth and increased capability for

planning/implementing PBL, fully adopting this strategy is not something that can be implemented in this limited time span. It is difficult for a workshop, meeting, or presentation to help teachers master the process of connecting “knowledge to the contexts of its application” (Barron et al., 1998, p. 272). Learning the essential elements of PBL and what an entry event are do not mean that teachers are ready to individually plan and implement a project on their own. That jump requires much more than PD, but rather systematic changes such as changes in the schedule, planning time, lesson formats, etc. In his work, Marx discussed the need to “address teachers’ beliefs, knowledge, and experience; the need to collaborate and reflect on practices; and the importance of contextualizing innovation and promoting systematic change” (1997, p. 350). This action research supports that while initial excitement and energy may take teachers through workshops, only systematic changes can make long term change sustainable.

Despite being unable to create a feeling of comfort with and perceived capability to plan PBL to all teachers at St. Mary of Carmel, the survey instruments showed a small group of outliers that seemed to have maintained their understanding of and motivation for PBL. A small group of teachers seems to have taken to the ideas and principles of PBL and have already implemented them successfully in their own classrooms begging the question: what worked for them? In most cases, teachers that found success were willing to take on the added responsibility of conducting research, taking classes, or watching videos on their own time outside of school. These teachers were willing to take a risk in their classroom and attempt the new strategy even if it meant a messy classroom, different planning or the possibility of failure. This action research highlighted the divergent needs and abilities among teachers, demonstrating even further what many researchers have already discovered:

traditional means of professional development, even when sustained over a long period of time, are not sufficient for effecting school change and supporting all teachers’ growth.

Dissemination

The findings of this AR project have been used already to inform and direct the planning of professional development at St. Mary of Carmel and will continue to guide the direction for the rest of the year. The full report was shared with the staff of St. Mary of Carmel during a February professional development day and with the Advisory Council during their February meeting. A representative from the Diocese of Dallas who previously expressed interest in PBL and our school’s journey to implementation has participated in a few professional development sessions with us and will be a liaison to communicate the findings with the rest of the Diocese. The final report will be given to the Diocese with permission to share with other principals throughout the Diocese.

Limitations

This study found limitations in a few inevitable factors. First, the sample size was fairly small due to the small nature of St. Mary of Carmel Catholic School. While all core teachers participated, some part time specials teachers were omitted from the study due to their inability to participate in the two-day workshop with Dr. Thom Markham. While the sample size in this particular situation could not be increased, it would be beneficial to conduct similar research at a larger school or at several other small schools. Another limitation of the study was the time constraints. In the future, this study would be best done over the course of a year with a survey being conducted in August, another in January, and finally a last installment of the survey being given in May. This would allow the survey to follow the trajectory of the entire school year and might avoid being impacted by slumps in teacher energy and motivation.

Lastly, a limitation of the study was the participants' motivation and willingness to engage in PBL. While there was initial teacher buy-in for this proposed instructional shift, it is doubtful that teachers fully understood the scope of work and change ahead of them. The surveys show that initial energy and interest resulted in increased results but the amount of work faded the initial excitement and motivation quite quickly and the final results show decreased scores. Other factors at the school such as beginning a new Diocesan-wide online observation process and beginning the process to prepare for accreditation may have also affected teacher energy and motivation. Another avenue to take in the future might include asking for teachers who are interested volunteering to participate in the study and serve as PBL examples for the rest of the school.

Future Directions

This action research was designed to determine the effectiveness of focused professional development in developing teachers' understanding of and capability to plan and implement PBL. While struggling to reach all teachers in a small Catholic School, this action research provided much insight to the limitations of traditional professional development. While this researcher still believes in the incredible value of PBL in reaching all of our students and integrating their academic content into relevant, engaging projects, it has become evident that forcing school wide implementation at such a rapid pace is not effective. As a school, we will be taking a slower route to implementation. St. Mary of Carmel is looking into a book study as a new avenue for more engaging, hands on development. We are also looking to schedule visits with other schools that are currently implementing PBL and if at all possible, attempting to collaborate with them.

Most intriguing however, has been the impact of outside webinars, classes, observations, and research on the

development of individual teachers. In seeing the success that some teachers have had with PBL in their classrooms, this action research project points to a new area of study: the impact of online courses and webinars on individual teachers' growth and development. Perhaps the key is finding a method that connects with each individual teacher. As always, the most important thing to remember that as educators, our job revolves around the best interests of our students. How can we create a learning environment that prepares our students to excel as Catholic stewards in the 21st Century? PBL is still the answer to that question but now it is time to ask a different question. How can we prepare our teachers to teach PBL? A 2-day workshop and follow up activities are not enough to sustain teachers as they make such an enormous pedagogical shift, so we look now to other avenues to ensure the successful implementation of PBL in our school.

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Table 1

Mean, Response Count, and Frequency for Teacher Understanding Questions at Time 1 (n = 14)

Item	<i>M</i>	Never Heard of This	2	3	4	Fully Competent
21st Century Skills	3.64	1 (7%)	1 (7%)	4 (29%)	4 (29%)	4 (29%)
An Entry Event	2.36	6 (42%)	2 (14%)	3 (21%)	1 (7%)	2 (14%)
A Driving Question	3.5	1 (7%)	2 (14%)	2 (14%)	7 (50%)	2 (14%)
A Project Calendar	3.35	3 (21%)	0 (0%)	4 (29%)	3 (21%)	4 (29%)
A Teaching and Learning Guide	3.14	3 (21%)	2 (14%)	2 (14%)	4 (29%)	3 (21%)
Authentic Project Assessment	2.92	3 (21%)	3 (21%)	2 (14%)	4 (29%)	2 (14%)
Using Rubrics	4	0 (0%)	1 (7%)	3 (21%)	5 (36%)	5 (36%)

Note. 2 = not sure; 3 = vaguely familiar; 4 = somewhat familiar

Table 2

Mean, Response Count, and Frequency for Teacher Comfort Level Questions at Time 1 (n = 14)

Item	M	Not at All	2	3	4	Most Definitely
Planning a PBL	2.43	5 (26%)	4 (29%)	0 (0%)	4 (29%)	1 (7%)
Implementing a PBL	2.86	3 (21%)	4 (29%)	0 (0%)	6 (43%)	1 (7%)

Note. 2 = somewhat; 3 = neutral; 4 = mostly

Table 3

Mean, Response Count, and Frequency for Teacher Understanding Questions at Time 2 (n = 13)

Item	M	Never Heard of This	2	3	4	Fully Competent
21st Century Skills	4.62	0 (0%)	0 (0%)	0 (0%)	5 (38%)	8 (62%)
An Entry Event	4.46	0 (0%)	0 (0%)	1 (8%)	5 (38%)	7 (54%)
A Driving Question	4.69	0 (0%)	0 (0%)	0 (0%)	4 (31%)	9 (69%)
A Project Calendar	4.69	0 (0%)	0 (0%)	1 (8%)	2 (15%)	10 (77%)
A Teaching and Learning Guide	4.23	0 (0%)	0 (0%)	2 (15%)	6 (46%)	5 (38%)
Authentic Project Assessment	4.08	0 (0%)	0 (0%)	4 (31%)	4 (31%)	5 (38%)
Using Rubrics	4.23	0 (0%)	0 (0%)	2 (15%)	6 (46%)	5 (38%)

Note. 2 = not sure; 3 = vaguely familiar; 4 = somewhat familiar

Table 4

Mean, Response Count, and Frequency for Teacher Comfort Level Questions at Time 2 (n = 13)

Item	<i>M</i>	Not at All	2	3	4	Most Definitely
Planning a PBL	3.54	0 (0%)	3 (23%)	2 (15%)	6 (46%)	2 (15%)
Implementing a PBL	3.62	0 (0%)	3 (23%)	2 (15%)	5 (38%)	3 (23%)

Note. 2 = somewhat; 3 = neutral; 4 = mostly

Table 5

Mean, Response Count, and Frequency for Teacher Understanding Questions at Time 3 (n =14)

Item	M	Never Heard of This	2	3	4	Fully Competent
21 st Century Skills	4.29	0 (0%)	1 (7%)	0 (0%)	7 (50%)	6 (43%)
An Entry Event	4.00	0 (0%)	1 (7%)	3 (21%)	5 (36%)	5 (36%)
A Driving Question	4.29	0 (0%)	1 (7%)	1 (7%)	5 (36%)	7 (50%)
A Project Calendar	4.21	1 (7%)	0 (0%)	0 (0%)	7 (50%)	6 (43%)
A Teaching and Learning Guide	3.57	1 (9%)	2 (14%)	2 (14%)	6 (43%)	3 (21%)
Authentic Project Assessment	3.71	1 (7%)	0 (0%)	3 (21%)	8 (57%)	2 (14%)
Using Rubrics	3.86	1 (7%)	0 (0%)	3 (21%)	6 (43%)	4 (29%)

Note. 2 = not sure; 3 = vaguely familiar; 4 = somewhat familiar

Table 6

Mean, Response Count, and Frequency for Teacher Comfort Level Questions at Time 3 (n =14)

Item	<i>M</i>	Not at All	2	3	4	Most Definitely
Planning a PBL	3.21	0 (0%)	5 (36%)	4 (29%)	2 (14%)	3 (21%)
Implementing a PBL	3.43	0 (0%)	3 (21%)	4 (29%)	5 (36%)	2 (14%)

Note. 2 = somewhat; 3 = neutral; 4 = mostly

Table 7

Mean, Standard Deviation, and ANOVA for Effectiveness of PBL Professional Development Survey

Variable	Time 1 (n = 14)		Time 2 (n = 13)		Time 3 (n = 14)		ANOVA
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i>
21 st Century Skills	3.64	1.48	4.62	0.26	4.29	0.68	4.06*
Entry Event	2.36	2.25	4.46	0.44	4.0	0.92	13.71*
Driving Question	3.5	1.35	4.69	0.23	4.29	0.84	6.10*
Project Calendar	3.36	2.25	4.69	0.39	4.21	1.10	4.89*
Teaching and Learning Guide	3.14	2.29	4.23	0.52	3.57	1.49	2.76
Authentic Project Assessment	2.93	2.07	4.08	0.74	3.71	0.99	3.66
Using Rubrics	4.0	0.92	4.23	0.53	3.86	1.21	0.53
Do you feel comfortable/ capable of planning a PBL Project?	2.42	2.11	3.54	1.10	3.21	1.41	2.86
Do you feel comfortable/ capable of implementing a PBL Project?	2.86	1.98	3.61	1.26	3.42	1.03	1.49

* $p < .05$

Table 8

Mean Responses Over Time: Ranking Knowledge of Key Concepts/Terms (on a scale of 1-5)

Item	<i>M- Survey 1</i>	<i>M-Survey 2</i>	<i>M-Survey 3</i>
21 st Century Skills	3.64	4.62	3.62
An Entry Event	2.36	4.46	3.38
A Driving Question	3.5	4.69	3.62
A Project Calendar	3.35	4.69	3.46
A Teaching and Learning Guide	3.14	4.23	3.15
Authentic Project Assessment	2.92	4.08	3.15
Using Rubrics	4	4.23	3.23

Table 9

Mean Responses Over Time: Comfort and Capability with Planning and Implementing a PBL (on a scale of 1-5)

Item	<i>M- Survey 1</i>	<i>M-Survey 2</i>	<i>M-Survey 3</i>
Planning a PBL	2.43	3.54	3.21
Implementing a PBL	2.86	3.62	3.43

Appendix A

Baseline Survey: August 2013

1. Please rate your understanding of the following terms/ideas/concepts on a scale of 1 to 5.

	1. I have never heard of this term/concept	2. I have heard of it, but I am not sure what this term/concept is	3. I am vaguely familiar with this term/concept	4. I am somewhat familiar/knowledgeable in this term/concept	5. I feel fully competent in this term/concept
21 st Century Skills					
An Entry Event					
A Driving Question					
A Project Calendar					
A Teaching and Learning Guide					
Authentic Project Assessment					
Using Rubrics					

2. Please assess your comfort level with the following.

	Not At All	Somewhat	Neutral	Mostly	Most Definitely
Do you feel comfortable/capable of planning a PBL project at this time?					
Do you feel comfortable/capable of implementing a PBL project at this time? (whether planned by you or someone else)					

For the following questions, please write a few sentences to share your thoughts and opinions.

3. Based on your prior knowledge, how would you define Project Based Learning?

4. What would help you to feel more confident in the planning of a project?

5. What would help you to feel more confident in the implementation of a project?

6. How do you think PBL will benefit your students?

7. Do you have any ideas for a project you could implement?

Appendix B

Mid-Line Survey: August 2013 (After 2-Day Workshop)

1. Please rate your understanding of the following terms/ideas/concepts on a scale of 1 to 5.

	1. I have never heard of this term/concept	2. I have heard of it, but I am not sure what this term/concept is	3. I am vaguely familiar with this term/concept	4. I am somewhat familiar/knowledgeable in this term/concept	5. I feel fully competent in this term/concept
21 st Century Skills					
An Entry Event					
A Driving Question					
A Project Calendar					
A Teaching and Learning Guide					
Authentic Project Assessment					
Using Rubrics					

2. Please rate your experience with the 2 Day PBL Workshop on a scale of 1 to 5.

	1. Strongly Disagree	2. Disagree	3. Neutral	4. Agree	5. Strongly Agree
The workshop gave me a better understanding of PBL.					
The workshop clearly detailed what components make a PBL project.					
The workshop helped me to understand how to plan a project.					
The workshop prepared me to implement PBL.					
I learned a lot from the workshop.					

3. Please assess your comfort level with the following.

	Not At All	Somewhat	Neutral	Mostly	Most Definitely
Do you feel comfortable/capable of planning a PBL project at this time?					
Do you feel comfortable/capable of implementing a PBL project at this time? (whether planned by you or someone else)					

For the following questions, please write a few sentences to share your thoughts and opinions.

4. Based on Dr. Thom Markham’s workshop, how would you define Project Based Learning?

5. Would you consider the 2 day workshop to be an effective tool for learning about Project-Based Learning? Why or Why not?

6. What activities/methods were the most helpful to you? The least helpful?

7. What strategies or methods would have been more helpful for you to gain a better understanding of Project-Based Learning?

8. What strategies/methods/activities would you like to see included in our future professional development based on Project-Based Learning?

Appendix C

Post-Development Survey: December 2013

1. Please rate your understanding of the following terms/ideas/concepts on a scale of 1 to 5.

	1. I have never heard of this term/concept	2. I have heard of it, but I am not sure what this term/concept is	3. I am vaguely familiar with this term/concept	4. I am somewhat familiar/knowledgeable in this term/concept	5. I feel fully competent in this term/concept
21 st Century Skills					
An Entry Event					
A Driving Question					
A Project Calendar					
A Teaching and Learning Guide					
Authentic Project Assessment					
Using Rubrics					

2. Please assess your comfort level with the following.

	Not At All	Somewhat	Neutral	Mostly	Most Definitely
Do you feel comfortable/capable of planning a PBL project at this time?					
Do you feel comfortable/capable of implementing a PBL project at this time? (whether planned by you or someone else)					

For the following questions, please write a few sentences to share your thoughts and opinions.

3. Would you consider our follow-up sessions to be effective in developing your knowledge of PBL? Why or why not?

4. What activities/presentations were the most helpful? Why?
5. What activities/presentations were the least helpful? Why?
6. What strategies or methods would have been more helpful for you to gain a better understanding of Project Based Learning?
7. How would you define Project Based Learning?
8. How do you feel about the progress of your current project?

Appendix D

Agenda

St. Mary of Carmel School

PBL & 21st Century Skills – August 8 & 9, 2013

Time	Task	Notes
Thursday, Aug 8		
8:00 – 8:30 am	Gather Welcome Agenda	
8:30 – 9:00 am	Why PBL? Why 21 st century skills? PBL vs. Projects	Thom
9:00 – 9:45 am	From Vision to Plan Your ideal student Grade level outcomes Need to Knows	Teams
9:45 – 10:00 am	Break	Thom/teams
10:00 – 11:00 am	Intro to PBL <i>Identify the Challenge</i> <i>Craft the Driving Question</i>	Thom
11:00 – 12:00 pm	Begin Planning	Teams
12:00 – 12:45 pm	Lunch	
12:45 – 2:00 pm	Continue planning Project Ideas	Teams
2:00 – 2:15 pm	Break	
2:15 – 3:00 pm	PBL Resources	
3:00 – 4:00 pm	Share ideas/Draft DQ	Mini-protocol
Fri, Aug 9		
8:00 – 9:00 am	The PBL Process <i>Start with Results</i> <i>Plan the Assessment</i> Doing 'Beautiful Work'	Thom
9:00 – 10:00 am	Planning	Thom
10:00 – 10:15 am	Break	
10:15 – 11:00 am	Managing a Project <i>Enroll and Engage</i> <i>Focus on quality</i> <i>End with Mastery</i>	Teams
11:00 – 12:00 pm	Planning	Thom
12:00 – 12:45 pm	Lunch	
12:45 – 2:00 pm	Complete Plan	Teams
2:00 – 3:30 pm	Critical Friends Protocol Share 3 Project Ideas	
3:30 – 4:00 pm	Action Planning for Fall <i>Implementing projects</i> <i>Timeline for review</i> <i>Debriefs and protocols</i>	Thom/Teams