Pathways to Excellence And Achievement in Research and Learning (PEARL): Training K-12 School Teams to Support Student Research

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Authors’ note
The goal of the Pathways to Excellence and Achievement in Research and Learning (PEARL) Project has been to design and deliver a training model that focuses on working with teams of teachers, librarians, and other school staff in collaboration with university librarians and educators to strengthen student research projects in Hawaii’s schools. This article briefly describes the rationale for the project, the design and implementation of the training project, and some of the results. The PIALA session on “Training K-12 School Teams to Support Student Research” is based on the PEARL Project.

Introduction

Schools in the United States are under tremendous pressure to increase graduation rates and reduce dropout numbers. Students who leave school claim that the curriculum is disconnected from real life and that their schools are impersonal systems where no one really cares about them (Wagner 2008). Organizations such as the National Governors Association have reported that graduates lack basic skills and have recommended that stronger connections between K-12 and higher education would improve students’ skills and create a more seamless academic educational pipeline from kindergarten through graduate school.

Realizing the need to develop curriculum that meets the demands of 21st century colleges and workplaces, schools are seeking alternatives to traditional education that stimulate rigorous and authentic inquiry. One such approach is project-based learning that involves critical thinking skills and the ability to retrieve and evaluate information and construct meaningful personal learning from a range of information sources. Project-based learning requires a complex set of competencies that depend on the student’s ability to initiate substantive questions, read and think critically, and use technology at all stages of the research process. Jean Donham (2007) and Teresa Neely (2006) summarize some of the key academic expectations and “gaps” in students’ researching abilities to achieve the expectations as follows:

- Sources of information and ideas: students are frequently unfamiliar with resources beyond their textbooks and encyclopedias.
- Development of appropriate and efficient search strategies: students are generally novices at developing search strategies; e.g., identifying keywords, synonyms, and related terms in a contextual relationship to relevant questions for inquiry.
- Retrieval of pertinent data: before locating a resource, students have difficulty determining what that resource is (e.g., book, chapter, journal) and its relevance as well as the skills to find it.
- Evaluation and assessment of findings: students are not able to identify and understand key concepts from retrieved information, restate those concepts and details accurately by
paraphrasing, and identify material that can be quoted. They also experience problems in analyzing websites and critically evaluating information and their sources.

**Birth of the PEARL Project**

The Pathways to Excellence and Achievement in Research and Learning (PEARL) Project was developed in response to the needs of students engaged in research. A three-year grant provided by the Institute of Museum and Library Services made it possible for a development team of faculty and librarians from the University of Hawaii at Manoa (UHM) and librarians from the Hawaii Department of Education (HIDOE) to design and implement a model for professional development that targeted instructional teams helping students with research projects. The training program focused on the following:

- Understanding the nature of the assigned projects and what they require of students
- Identifying the critical learning needs of students to achieve success
- Exchanging examples of effective teaching strategies and practices
- Collaboratively designing and implementing action plans to help students achieve their project goals
- Assessing for student achievement and reflecting on teaching practices

The following units at the UHM were the principal partners: the Library and Information Science Program in the Department of Information and Computer Sciences and the UHM Libraries. They worked cooperatively with the HIDOE and the Hawaii P-20 Partnerships for Education.

Based on an existing body of research regarding the critical elements for effective professional development (e.g., Penuel et al. 2007; Supovitz 2002), the PEARL Project incorporated the following features in the training:

- Active inquiry-oriented learning--time for instructional planning, discussion, and consideration of underlying principles of project-based design
- Coherence--alignment of professional development with teachers’ personal goals for learning and their goals for students, coherence with other reform activities and standards in the teachers’ local school contexts
- Sustained learning and support—moving beyond the conventional one-shot workshops and formal course formats to a year-long learning and teaching experience that combines iterative cycles of planning, trial, reflection, and modification/change; providing ongoing mentoring and peer critiquing opportunities in both face-to-face and online formats
- Problem solving regarding local barriers and supports--addressing conflicting demands and school-specific initiatives as a real part of the challenge

**Importance of Librarians as Team Teachers**

A critical component in PEARL was highlighting the role of school librarians as teaching partners. The current standards established by the American Association of School Librarians (2007) and the Association of College and Research Libraries (2000) underscore the importance of librarian involvement in student learning. There is a growing body of literature on the positive impact of school library programs on student achievement. Among the most widely cited research have been the studies undertaken by Keith Curry Lance and colleagues (cited in Todd
2003). The surveys have involved hundreds of primary and secondary schools in Colorado, Alaska, Pennsylvania, New Mexico, Oregon, and Texas. They have provided statistical data that establish a correlation between school library programs and student achievement. Students themselves have voiced overwhelming support for school libraries in a survey commissioned by the Ohio Educational Library Media Association and conducted by Carol Kuhlthau and Ross Todd of Rutgers University (Whelan 2004). Almost 89 percent of the students responding to the survey indicated that instruction in the libraries helped them get better grades on projects and assignments. Building on these various studies, the PEARL Project sought to provide further evidence that school librarians positively influenced student performance in locating and using information, applying computer technology, strengthening reading comprehension, and developing study habits that encouraged independent learning.

Training Targets for PEARL

The specific objectives of the PEARL training were to
- identify critical learning targets in the research process
- create and implement instructional plans to address these learning targets
- collaborate in team teaching opportunities
- incorporate the appropriate use of university library resources and mentors for specific student needs
- design tools and strategies to assess the quality of student progress and student products

PEARL training focused on a practice-based foundation for in-service professionals that used authentic records and tools for teaching and learning. The aim was creating a common ground for individuals and teams to work, co-reflect, explore alternatives, and support each other (Ball and Cohen 1999). Activities were grounded in participants' ongoing efforts to design project-based learning and strategies for assessing student learning. This approach recognized that curriculum reform involved “just in time” learning focusing on immediate problems of practice. It acknowledged that the processes of teaching and learning were ambiguous, complicated, and nonlinear. Therefore, the curriculum centered on the tasks, questions, and problems situated in practice.

Implementation of PEARL Training

Year 1 (2009-2010) was devoted to designing the training program. The development team conceived it as a year-long course that began with a one-week institute bringing school teams together at a school library on the island of Oahu. Following the week of face-to-face work, teams were expected to continue planning and implementing their work with students during the subsequent school year. During their site-based work, teams would be asked to produce reports and reflections online in Laulima, a course management system operated by UHM. At the end of the school year, each participant would have to produce a portfolio that included lesson plans and student work samples as well as a completed action plan and a final reflection piece. All participants that satisfactorily completed their portfolios would receive three in-service credits through the UHM Outreach College. In Years 2 and 3 (2010 through 2012), we implemented this training model with two different cohorts.
Results of the Training

Four outcome-focused questions drove the PEARL Project.

- What elements of professional development strengthen teaching practices associated with the facilitation of project-based learning?
- How is the instructional relationship between teacher and librarian influenced by collaborative involvement in professional development?
- What learning outcomes do teachers and librarians initially perceive as critical to student success in capstone projects? How are these perceived outcomes similar or different? Are there changes in the outcomes as a result of collaborative professional development?
- How is student performance impacted by teacher-librarian teaching practices in project-based learning?

We ultimately worked with 62 participants in 26 K-12 schools in Hawaii. The majority were high school educators. Evidence of their work was gathered through an analysis of the participants’ online reports and logs as well as their final portfolios. Additional information was collected through onsite interviews following the training. We discuss some of our findings in the remainder of this article.

1. How did the PEARL training influence the implementation of learning objectives?

Participants indicated gains in implementing all learning objectives addressed in the institute (Table 1). Implementation levels were measured with a five-point Likert scale in the pre/post-retrospective implementation survey. Based on a t-test for pre- and post-professional development implementation levels, all increases were significant at p<.05. Overall, the teachers’ and librarians’ implementation levels increased 0.97 for all objectives on a five-point scale.

<table>
<thead>
<tr>
<th>Objectives for Teachers and Librarians</th>
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<tbody>
<tr>
<td>1a. Strategies to motivate students in making project selections</td>
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<td>1b. Criteria to assess project possibilities</td>
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<td>2. Strategies to help students pre-search</td>
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<td>3. Strategies to help students generate questions</td>
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<td>4. Strategies to help students write clear purpose statements</td>
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<td>5. Strategies to help students identify key words and phrases</td>
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<td>6. Strategies to help students identify and evaluate useful sources for information</td>
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<tr>
<td>7a. Strategies to help students develop research plans</td>
</tr>
<tr>
<td>7b. Strategies to help students evaluate their progress and final research paper</td>
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<tr>
<td>8. Strategies to help students analyze and synthesize information and construct personal meaning</td>
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<td>9. Strategies to conference with students</td>
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</table>

In the onsite interviews, participants provided specific comments about the value of investing more time in different phases of the research process and using various strategies that were introduced in the institute. Examples follow.
A teacher admitted that getting the students to select topics of relevance and interest was the first major hurdle in working with students. She indicated:

> The Assessing the Topic of Choice [introduced in the training] was a good tool to use when conferencing with the students. It made them evaluate their topics based on the criteria provided. During our conferences with the students, these criteria helped us provide the students with specific feedback on their topics.

Many teachers found the different strategies and tools for generating questions of higher order thinking especially useful and effective. As one teacher stated:

> The Question Master game appealed to the students individually and collectively; they surprised themselves with the range and depth of questions they came up with. The different perspectives made it easier to understand how thinking levels varied and really “shredded” the topic. This was a great start for the next handout, which was the Question Generator for My Topic.

Encouraging students to assess their own progress became a more integral part of the total learning experience. One librarian said:

> It was a good idea to incorporate assessment checklists into the worksheets. This helped students be aware of the criteria for their work. Also, the PEARL Conferencing Check-Log for Research was a great forum for students to reflect on the research process and for mentors to provide specific feedback on the students’ reflection and progress.

> I was surprised that students were able to articulate their feelings, understand their learning targets, and provide wonderful feedback on their learning process. The rubric I used as a reflection piece was invaluable and I will continue to use this template for years to come. The main reason it worked was students were able to identify their needs and what they felt they could improve upon. As a teacher, I couldn’t ask for better feedback than having students be able to tell me themselves.

2. Which aspects of the PEARL training were deemed most useful by the participants?

We organized the responses about the training in three major clusters: strategies that supported the (1) enhancement of background knowledge, (2) implementation of instruction, and (3) development of instructional teaming.

**Enhancing background knowledge:** participants indicated that they made gains in background knowledge about pedagogical principles and integrated instruction through a range of training activities that included direct instruction and guided practice, opportunities to exchange ideas across teams in the institute and online during the ensuing school year, and the application of strategies in their own schools. They also indicated that the reflections captured at the institute and in team reports and individual logs throughout the school year were invaluable components for individual and team growth.

**Strengthening strategies for implementation:** participants valued learning approaches modeled throughout the institute. This included direct instruction followed by sessions where they could
question, clarify, and contribute more ideas and strategies. One teacher commented on the benefits of planning time at the institute:

*The time to plan that was given to us at PEARL was really important. We got to sit down, all four of us together. And we pretty much planned the whole research process out. [We decided] that the librarian was going to do this, and that K [one of the teachers] and I were going to make sure that we were on the same page. We were going to use these documents from PEARL...and then A [another teacher] was going to do this....*

The participants noted that situated practice challenged them to apply these strategies in their own classrooms and libraries and to modify strategies based on student needs and real-world constraints in their respective schools. A librarian described the following give-and-take exchange with one of her teachers. As they closely observed what students were doing, they made necessary adjustments to their team taught instruction.

*The students kind of took a step back at one point because they realized their questions weren't that good. We had continued on but then we said that we should get them to think a little more. We also took a step back to the question generation phase...we wanted to get them thinking by posing them with some questions.*

In another school situation, the librarian and counselor substantially revised an online guide for senior projects. The librarian noted:

*Last year, it [the senior project manual] was a 45-page document online and finding anything in it was tough. It wasn't chunked out and individually split. I came back from PEARL and spent two weeks putting the guide together and I ran it all past B [counselor] while I was doing it. We actually decided on a lot of things we wanted to do at PEARL because we used those sessions to sort of look back. We were going back and forth on how we were going to make this better and what we were going to do that was different. I know that this whole online manual came directly out of PEARL.*

**Supporting instructional teaming:** situated practice—the application and refinement of strategies in actual school settings—was most frequently mentioned as positively influencing the instructional relationship between teachers and librarians. The PEARL training model focused on practice embedded in school situations requiring team members to communicate with one another and to collaborate on various aspects of research with students. One teacher captured the power of teaming as follows:

*Hands down, the BEST part of this project was the collaboration with T (librarian). Working with her bumped up the quality of the thesis statement tremendously. There is no doubt that taking the PEARL institute as a team made the research process much more palatable. We had a clearer sequence of the process and definitely had a better handle on how to get to the thesis statement.*

The teams recognized that situated practice made both the teaching and the teaming effective in their school settings. In the interviews, they described vetting ideas, testing strategies, debriefing the lessons, and adjusting instruction based on student feedback. This collaborative form of iterative instructional design made the participants feel safe and supported in taking risks with new strategies.
The participants mentioned the importance of modeling new concepts and allowing for guided practice, peer feedback and discussions on applying these strategies in different school settings. The immediate and specific feedback provided by the PEARL trainers influenced the participants’ willingness to experiment with newly discovered tools and techniques.

3. At the end of the PEARL training, which aspects of the research process did teachers and librarians view as critical for student success? Were there differences between teachers and librarians?

Teachers and librarians agreed that the pre-searching activities and thesis support were crucial for selecting researchable topics and formulating clearly stated and thoughtful foci. Both groups also mentioned additional aspects of the research process that they were primarily responsible for teaching and monitoring. To elaborate, teachers worked with students on selecting relevant topics and generating questions. They also kept track of students’ reflection logs as a routine part of the conferences with individual students. Librarians, on the other hand, targeted the aspects of research that they taught in the library sessions; namely, selecting and evaluating relevant resources in a variety of print and digital formats as well as organizing and synthesizing the collected information by teaching students different forms of note taking.

The interviews provided further insights into the perceptions and practices of the participants. For example, a librarian observed that the notion of pre-search had been foreign to many of her teachers prior to the institute. However, as a result of the training, she noted:

*I think in the past, teachers did not realize the importance of giving students time to explore and conduct pre-researching before selecting their final topic. After the workshop, the teachers I collaborated with scheduled days for pre-search and I feel it was very useful. This also gave us time to meet with each student to talk about his or her topic and possible avenues of research and how it could tie into the actual project.*

The development of clear and focused thesis statements remained a challenge for instructors and students alike. The teachers and librarians expressed their appreciation for the different strategies introduced at the institute to deal with this issue. One librarian elaborated on a team taught approach that proved effective:

*The students had to draw their own graphic to explain the parts of the thesis statement; they were creative at the same time they were able to show their understanding. Later, we had the students verbally present their thesis statements to the class and the students gave “plus” and “minus” feedback to them. We then worked as a class to help the students craft even better statements.*

4. How was student performance impacted by teacher-librarian teaching practices?

Teaching teams used rubrics and checklists to assess student performance on the different phases of research. Although they could use the assessment tools introduced at the PEARL institute, they were also allowed to design their own instruments. From the aggregated results, we noted the following:
- The largest number of teachers and librarians (22 of 25) taught students pre-searching skills and techniques for topic selection. Students in these particular classrooms performed highest in this area with 89 percent meeting or exceeding established criteria.
- Question generation and information organization and synthesis were also heavily taught with 19 of 25 teachers and librarians reporting that they conducted hands-on sessions with students.
- The highest percentages of students meeting or exceeding expectations were for selecting and evaluation resources (84 percent) and keeping reflection logs and journals for self-assessment (83 percent). Identifying keywords for searching was not separately assessed but was integrated into the selection and evaluation of sources.
- Although teachers had indicated high confidence levels in helping students with research plans, only 9 of them actually required plans. This was also the area where students received the lowest performance ratings (69 percent met or exceeded expectations).

Table 2 organizes the results by phases of the research process and summarizes student performance for each of the phases.

Table 2. Student performance on phases of the research process.

<table>
<thead>
<tr>
<th>Phase of research</th>
<th># of instructors teaching</th>
<th># of students involved</th>
<th>Met/exceeded objective</th>
<th>Did not meet objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selecting a topic/pre-searching</td>
<td>22</td>
<td>597</td>
<td>532</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>89.11%</td>
<td>10.89%</td>
</tr>
<tr>
<td>Generating questions</td>
<td>19</td>
<td>418</td>
<td>309</td>
<td>109</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>73.92%</td>
<td>26.08%</td>
</tr>
<tr>
<td>Creating a thesis statement</td>
<td>16</td>
<td>205</td>
<td>148</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>72.20%</td>
<td>27.80%</td>
</tr>
<tr>
<td>Selecting and evaluating information sources</td>
<td>10</td>
<td>603</td>
<td>507</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>84.08%</td>
<td>15.92%</td>
</tr>
<tr>
<td>Devising a research plan</td>
<td>9</td>
<td>240</td>
<td>167</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>69.58%</td>
<td>30.42%</td>
</tr>
<tr>
<td>Self-assessing, reflecting, and journaling</td>
<td>17</td>
<td>395</td>
<td>329</td>
<td>66</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>83.29%</td>
<td>16.71%</td>
</tr>
<tr>
<td>Organizing and synthesizing information</td>
<td>19</td>
<td>303</td>
<td>228</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>75.25%</td>
<td>24.75%</td>
</tr>
</tbody>
</table>

**Conclusion**

Through the interviews and logs, teachers and librarians confirmed that the PEARL training made them more aware of the need to increase the instructional time for certain phases of the research process. These areas included pre-search exploration, and the development of thesis
statements, questions, and research plans. Teachers and librarians recognized the importance of the interaction with students and the value of prompt and targeted feedback. One teacher wrote:

I’m becoming more intentional in designing lessons where students interact with each other and where I can give more immediate descriptive feedback. For example, when I first introduced the Mystery Topic Quiz Master activity to my classes, I had them first work individually, then I pooled their work together into small groups, and then they presented what each group thought was their best question. As the group’s spokesperson shared, I would give them a “thumbs-up” or “thumbs-down.” In the case of a “thumbs-down,” a brief explanation would follow. Students seemed responsive, wanting to look smart with their questions. The quality and range of questions improved beyond the usual 5W’s + 1H.

A librarian commented on students’ research plans serving as blueprints for projected work:

Having students create a research plan was a means to helping students organize their time and activities, so that they could do research effectively. My students were required to create a timeline of activities or Gantt chart specifically for their research and mentoring.

The teams emphasized the power of collaborative planning and teaching and the critical nature of the one-on-one conferencing with the students. The following is a representative teacher’s comment on the importance of engaging students in ongoing, informal exchanges about their progress:

Scheduling one-on-one conferences held students more accountable for their progress. The individual conferencing, especially informal ones initiated by the student, were instrumental in helping students who were grappling with how to proceed with their research.

All teams experienced hurdles that were challenging to surmount. Some of the obstacles were linked to students’ lack of motivation to complete research projects. This resulted in school-initiated action plans to focus on more individual conferencing and peer interaction and to integrate additional technology tools for learning. Both teachers and librarians admitted that lack of time exacerbated by restrictive testing schedules made it difficult to teach all aspects of the research process. Therefore, many teams have plans in motion to begin work on research skills earlier than the senior year. All the high schools participating in the PEARL training reported that they were able to gain administrative and faculty support to begin research activities with juniors, and in some cases, even earlier with freshmen and sophomores. One teacher indicated how the team’s PEARL-influenced work has had a positive impact on school wide plans for improvement:

What’s interesting is that what we learned as a group was actually something that a lot of teachers were dealing with on campus. That is, the writing and research processes are things we needed to emphasize. Moreover, the need to improve students’ writing skills was something that teachers identified when our principal actually interviewed every single staff member on campus. The plan that we developed at the PEARL institute came up and they started talking about it in the leadership group as something that we all needed to do.
What we have discovered is that helping students to pursue meaningful research requires deeper attention to the many steps involved in the process. By working together as teaching teams, we engage in teaching and learning practices that empower our students to become more thoughtful and motivated researchers.

Acknowledgments

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