

Project-Based Learning and the Future of Project Management

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Abstract

A new teaching method is being widely adopted across the globe that is demonstrating double-digit performance increases on standardized testing. This teaching method is called Project-Based Learning, and it's changing the future of project management in the classroom today. As Project Management emerges as a professional discipline, we must prepare for the quantum leaps of radical change that our youngest project managers hold promise of delivering.

Projects require a complex set of competencies such as problem solving, decision-making, time management, research, analysis and synthesis of information, communication, and conflict resolution, especially in a collaborative team environment. But they also require strategies and methods for planning, doing, and completing them. Much like scientists use the scientific method as a standard way to conduct scientific experiments, project management methods provide a standard way for conducting them, allowing those involved to focus on the content of what the project's about rather than figuring out how to get it done. While the professional discipline of project management has emerged in business where these complex competencies and methods are needed, the demand for these skills has extended deep into our future workforce's student career.

Introduction

Project-Based Learning (PBL) has become a well-funded teaching method being implemented in K-12 (primary and secondary) school reform efforts across the United States and around the globe, demonstrating remarkable results in improving student performance. Organizations such as the Bill & Melinda Gates Foundation, who have contributed over \$1.9 billion in grant funding to school reform research and initiatives since 1999 (Bill and Melinda Gates Foundation, 2004), are fueling the implementation of PBL in schools from coast to coast. Yet while PBL is demonstrating phenomenal results in standardized testing, there remains a missing component to effectively teach students fundamental project concepts and strategies they need for the knowledge / technology-based workforce they will soon enter.

Many parents are not aware that the traditional teaching methods they experienced in school are being replaced, and new skills are required to compete for grades. Project-based learning (PBL) is a contemporary concept in education being widely implemented around the world, with literally thousands of projects underway via the Internet at any given time. Emerging patterns in school reform, and particularly with small school reform initiatives, show the integration of projects as a mainstream teaching method that tie curriculum competencies with real-world skills students need for a successful transition to college and careers.

PBL & School Reform

Today, project assignments begin in elementary school and become increasingly complex as the student progresses. Many middle and high schools require project portfolios as a pre-requisite to graduation, and colleges will often use a student's resume of project work as admission criteria. High school diplomas adopted nationwide, such as the CIM (Certificate of Initial Mastery), require a Senior Project by which the graduate-candidate demonstrates the mastery of a defined set of criteria via a project of their choosing. Students in schools around the United States are now required to perform community service as a part of graduation requirements, which often involves community project work.

The number of schools involved with education reform is growing, most of which have incorporated projects as a key ingredient to the student's new learning experience. The extent of this is demonstrated via the Coalition of Essential Schools website, which contains one of the most extensive listings of schools affiliated with education reform, with a total of 358 schools in 17 states, as well as four international schools (CES National, 2002).

Many schools and districts are implementing project-based learning as a component of a larger overhaul of their schools through a reform movement called small schools, where larger schools are breaking themselves up into smaller ones that co-exist within the same facility. The purpose of this is to create smaller learning communities of

students, teachers, and counselors to improve learning, engage students, cut absenteeism, cut drop-out rates, and better prepare students for college.

In a recent article in *Education Week*, Caroline Hendrie reported, "Statewide efforts are taking root from Maine and Rhode Island to Oregon and Washington State. Some districts, such as Houston, Kansas City, Kan., and Sacramento, Calif., have committed to district wide strategies of small high schools and learning communities. In many others, including Baltimore, Boston, Chicago, San Diego, and Oakland, Calif., district leaders are in the midst of major efforts to start new small high schools and restructure existing ones," (Hendrie, 2004). Small school reform has gained considerable momentum state-by-state, making its way into national politics now endorsed by Presidential Candidate, John Kerry, as a key component of his education platform.

What is Project-Based Learning?

Project-based learning actively engages students in the problem-solving, learning process through planning, doing, and completing projects. This new teaching paradigm embraces the belief that children learn best by applying concepts to real-world scenarios. The Chinese philosopher, Confucius, stated this concept concisely, "I hear, and I forget. I see, and I remember. I do, and I understand." It's through this process that the brain gains understanding and assimilation of the lesson being learned, and retains the understanding of that lesson at a higher rate than traditional classroom, single-topic instruction. PBL is considered to be a revolution in education, replacing outdated passive learning models of single topic study with active learning using "multiple-intelligences".

"Both research and developments in education have recently led to instructional innovations designed to make the classroom into a learning environment which is more responsive to the varying learning needs and interests of individual children. There is concern for memorable learning as well as memorized learning. Children are expected to work cooperatively on complex and open-ended tasks as well as follow instructions in step-by-step learning. The project approach provides one way to introduce a wider range of learning opportunities into the classroom," (Chard, 2001).

In one extensive study, project-based learning was highlighted as a common element in school reform that connects learning with real world application. This study was conducted as a joint venture by Jobs for the Future, the Coalition of Essential Schools, and the U.S. Department of Education's New America High Schools Initiative, with funding support from the Northeast and Islands Regional Educational Laboratory at Brown University.

"One of the most striking similarities across all of the schools is their focus on preparing students for both college and careers... Most of these career-focused programs of study include project work inside the school as well as internships in the community. Such experiences are designed to allow students not only to apply academic knowledge but also to develop 'high-performance competencies' in areas important to both college and careers, such as problem-solving, teamwork, and information searching and management. These experiences also afford a significant number of young people the opportunity to work alongside adults who push and support them to meet real-world standards," (Allen, Almeida, Cushman, DeSalvatore, Malarkey, & Steinberg, 2000).

This new frontier of education has emerged, and projects are now an integral part of a child's learning experience. "Projects are increasingly important," per Denise Gudger, Eugene, Oregon 4J School District Curriculum Coordinator. "This whole thing about project-based learning helps students to become more self-directed learners. It equips them with the decision-making, problem-solving tools and communication skills to really manage their own learning process." (Cooper, 2003)

With more teachers assigning projects, the task of doing multiple and simultaneous classroom projects is a common predicament. Yet projects are not just limited to the classroom. Kids are involved in projects through social clubs, youth groups, team sports, as well as personal projects. Today's average student is faced with doing projects in all areas of their lives. As it stands, kids and parents are left to their own devices to struggle through the myriad of projects they face.

Driving Forces to PBL Adoption

The urgency for reform has been driven by a combination of national legislation demanding improved school performance and the expansive availability of technology and funding from organizations that are filling an under-served need in communities strapped for cash to support their schools. With pressures for reform being driven by the No Child Left Behind Act, schools are struggling to deliver better results with fewer resources.

Many school districts, largely funded through local taxes, have suffered multi-year budget deficits due to the economic downturn, which has forced them to seek newer, effective teaching methods, as well as alternative funding resources. One such example is the Northern California Rural Challenge Network in Mendocino Valley, California, where the project-based learning teaching method has proven to be a cornerstone to their success. Per the NCRCN website:

“With our lumber and fishing industries in decline, the communities served by our districts face a deteriorating economic base and declining enrollment in the schools because of low population growth. We had to implement changes in our schools more quickly than we had before, and with more thoughtfulness as well. We saw that educational changes must be intricately tied to economic revitalization and environmental sustainability,” (North Coast Rural Challenge Network, 2001).

Through the support of businesses and non-profit organizations focused on school reform, PBL has become a preferred choice of many teachers, schools, and districts seeking effective methods with proven results.

Research Findings

Studies are showing double-digit, multi-year performance increases in standardized testing by students taught in a PBL environment over students from a traditional classroom environment. Per the George Lucas Education Foundation, “A growing body of academic research supports the use of project-based learning in schools as a way to engage students, cut absenteeism, boost cooperative learning skills, and improve test scores. Those benefits are enhanced when technology is used in a meaningful way in the projects,” (George Lucas Educational Foundation [GLEF], 2004b). These indicators demonstrate the effectiveness and impact PBL offers, increasing the demand for the project skills students need.

British Math Study

A three-year 1997 study of two British secondary schools -- one that used open-ended projects and one that used more traditional, direct instruction -- found striking differences in understanding and standardized achievement data in mathematics. The study by Jo Boaler, now associate professor of education at Stanford University, found that students at the project-based school did better than those at the more traditional school both on math problems requiring analytical or conceptual thought and on those considered rote, that is, those requiring memory of a rule or formula. Three times as many students at the project-based school received the top grade achievable on the national examination in math (GLEF, 2004b).

Co-nect Study

A 1999 study by the Center for Research in Educational Policy at the University of Memphis and University of Tennessee at Knoxville found that students using the Co-nect program, which emphasizes project-based learning and technology, improved test scores in all subject areas over a two-year period on the Tennessee Value-Added Assessment System. The Co-nect schools outperformed control schools by 26 percent (GLEF, 2004b).

Cognition and Technology Group

A 1992 study of 700 students from 11 school districts in Tennessee found that students doing projects using videotaped problems over a three-week period performed better in a number of academic areas later in the school year. The study, by the Cognition and Technology Group at Vanderbilt University, examined student competence in basic math, word problems, planning capabilities, attitudes, and teacher feedback. Students who had experience in the project work performed better in all categories. The study appeared in *Educational Psychologist*, 27 (3): 291-315 (GLEF, 2004b).

This study of the Rocky Mountain School of Expeditionary Learning (RMSEL) in Denver compared teacher practice and the school's student achievement data to those of the four Denver-area districts from which the student population is drawn. In comparison to a group of schools with similar demographics, teachers at RMSEL used significantly more coaching and project-based learning and significantly less direct instruction and independent seatwork. RMSEL students consistently outscored the weighted average of students from its four feeder districts across all grade levels for each year of the five-year study period on the Colorado State Assessment Program. RMSEL students scored on average 11.9 percentage points higher in reading than those of the comparison group (Sterbinsky, 2002).

Union City, New Jersey School District

The Center for Children and Technology at the Education Development Center, Inc., monitored a two-year technology trial that was first implemented in the district in September of 1993. The study found that after multimedia technology was used to support project-based learning, eighth graders in Union City, New Jersey, scored 27 percentage points higher than students from other urban and special needs school districts on statewide tests in reading, math, and writing achievement. The study also found a decrease in absenteeism and an increase in students transferring to the school. Four years earlier, the state had been considering a takeover because Union City failed in 40 of 52 indicators of school effectiveness (Education Development Center, Inc. Center for Children and Technology, 1996).

PBL Schools & Project Examples

There is a growing list of PBL schools. An example of how schools use PBL is Mountlake Terrace High School in Mountlake Terrace, Washington, where teams of students in a high school geometry class design a state-of-the-art high school for the year 2050. The students create a site plan, make simple architectural drawings of rooms and a physical model, draw up a budget, and write a narrative report. They present their work to real architects, who judge the projects and "award" the contract (Curtis, 2001). Another highly noted PBL school is Napa Valley High Tech High School, in Napa Valley, California, based totally on project-based learning curriculum and teaching methods.

"The most exciting aspect of education at NTHS is directly connected to this access to technology. It's called "project-based learning", and it very nearly comprises a revolution in itself. Instead of plugging their knowledge into fill-in bubbles on scantron sheets at finals time, students present tech-based projects about the subject at hand," (Napa New Technology High School & New Technology Foundation, 2004).

The school is about to enter its 8th year of operation, and is one of four models of national education reform chosen and funded by the Bill & Melinda Gates Foundation for replication.

Technology & Project Examples

Technology-driven, grassroots groups have formed to address the growing field of PBL. Internet PBL forums are an example of this growth, like iEARN (International Education and Resource Network), a non-profit organization made up of over 15,000 schools in 100 countries. iEARN empowers teachers and young people around the world to work together online using the Internet and other new communications technologies in a project-based learning environment. Approximately 750,000 - 1,000,000 students each day are engaged in a project-based learning portal for collaborative project work worldwide (iEARN, 2004a). Similar to this is the Global SchoolNet Foundation, a growing international network of 70,000+ online educators, who engage in online project-based learning activities. Since its inception, Global SchoolNet has reached more than a million students from 25,000 schools across 100 countries (Global SchoolNet, 2004a). Several examples of the kinds of projects that middle and high school students are involved with include;

- Life On the Streets: Stories About San Diego's Homeless From a Youth View - The project tells about life on the streets of San Diego through the eyes of youth. This website was created by a team of San Diego students, who were all homeless at one time. (Global SchoolNet, 2004c).

- Terrorism: the Biggest Challenge to Diplomacy – The project focused on how to reduce the number of terrorist attacks in the world. Five students in Mexico, who developed specific recommendations to achieve this, conducted this project (Javier, Carlos, David, Victor, & Richard, 2004).
- Water Habitat Project: a Global Water Study Through Local Student Research - Participants around the world study a local water habitat as an environmental science project, share observations and data with one another to learn about connections among water habitats worldwide (iEARN, 2004c).

The Internet offers an open field of possibilities for students and teachers to collaborate on projects, expanding the need for project skills beyond the classroom and outside the traditional boundaries of learning.

Organizations Involved with PBL

The increasing number of institutes and associations dedicated to supporting project-based learning underscores the growing acceptance that PBL improves student success in the classroom. These include the Buck Institute for Education, the Project Management Institute Educational Foundation, the Center for Collaborative Education, International Society for Technology in Education (ISTE), and the George Lucas Education Institute (Buck Institute for Education, 2002, Project Management Institute, 2002, Vaishnav, 2001, NFIE, 1997, & GLEF, 2004a). Education associations, such as the National Education Association (NEA) and the National Foundation for the Improvement of Education (NFIE), actively support implementation of project-based learning through professional development and grant funding (The NEA Foundation from the Improvement of Education, 2004).

Much of the PBL program development and research has been sponsored through the collaboration of these organizations. One example, a co-sponsored research project called, “Foundations for the Road Ahead: Project-Based Learning and Information Technologies,” (NFIE, 1997) between ISTE and NFIE, funded by the Bill and Melinda Gates Foundation, was a multi-year study conducted at six selected schools that implemented PBL teaching practices through technology supported projects. Findings from this study cited increased student engagement, especially noted in at-risk students, and improved student performance.

The George Lucas Educational Foundation is another non-profit organization supporting collaborative research studies on project-based learning, several of which are cited herein (GLEF, 2004a). Founded by filmmaker, George Lucas, the GLEF focuses on documenting and disseminating models of the most innovative practices in K-12 schools, including PBL.

The WestEd Regional Technology Education Consortia (RTEC) is another example of how non-profit education reform organizations are supporting the development and implementation of PBL (WestEd & RTEC, 2004a). Per Bo Delong-Cotty, Director of the Learning and Teaching with Technology initiative at RTEC,

“A major focus of this initiative is project-based learning, and we are dedicated to helping promote PBL in many different ways. In collaboration with the Computer Using Educator's (CUE) group, we developed and managed a new strand for the annual CUE conferences. This past March, the PBL strand featured 3 workshops and 21 sessions, all dealing with project-based learning. Overall, more than half of the 2400 conference participants attended at least one PBL strand session or workshop.”

Non-profit organizations such as these demonstrate how educators, reformists, consultants, and private funding through business sponsorship are influencing how kids learn in the classroom, and are changing the course for what skills and curriculum resources they need to succeed.

Conclusions

Impact to the Future of Project Management

The timing of school reform and adoption of PBL parallels the emergence of the project management profession, now recognized by organizations and businesses as a core competency needed in their professional ranks. Project management methods developed for high-risk projects such as the Apollo Space Mission in the 1960's culminated in the launch of the Project Management Institute (PMI) in 1969, initiating the development of systems of thought and discipline needed across all industries and organizations, where projects are the engine through which initiatives and innovation are done.

PMI has become the professional standard for project management; including creation of the Project Management Body of Knowledge, the Project Management Professional credentialing, and most recently the Organizational Project Management Maturity Model used by organizations to assess and improve their organizational project management competencies and project success rate. At the close of 2003, PMI represented over 120,000 members in 135 countries (Project Management Institute, 2003), transforming the way projects get done around the world. It is now that these two separate initiatives have crossed paths with an opportunity to serve each other in ways never before imagined.

Urgent Need for Project Skills

Projects have become an integral part of a student's K-12 learning experience, yet no curriculum, or rubric, for how to do them is in place. Taking this further, higher education institutions scarcely offer project management curriculum or programs, leaving many students to struggle through a growing dependency on projects that educators use as assessment tools for measuring their performance. While educators have tapped into a teaching method that truly engages the student in active learning, students (as well as most teachers and parents) have not been provided a standard framework and skill set for consistently doing projects.

Author, Kimberly Liegel, PMP, first realized this need after her own children started coming home with complex project assignments as early as the fourth grade. At the time, she was managing high-risk software development projects and implementing project management methodology. She found herself struggling to explain the same fundamental project concepts to her kids that her fellow associates, PhD level scientists and engineers, lacked. She realized then that this was a systemic education problem, and that these fundamental project management concepts and theories were missing from the chain of institutionalized education.

The results of this are evident in the high rate of project failures reported by industry research studies, including one by the Standish Group in their 1999 Chaos report that found in a five-year study, "Corporate America spends more than \$275 billion each year on approximately 200,000 projects. Many of these projects will fail, but not for lack of money or technology; most will fail for lack of skilled project management," (The Standish Group International Inc., 1999).

This lack of systemic, foundational project methods and concepts is having an impact on the nation's economy and exposes a costly gap in America's educational curriculum. Unless addressed at the front end of the education chain, where students begin their journey into the complex realm of doing projects, this economic drain will continue for generations to come. Our innovative capacity will not be fully realized, as projects are the engine through which raw ideas are transformed into innovative results.

An unprecedented opportunity has arrived for the project management profession. The Project Management Institute and affiliated non-profit organizations, chapters, SIGs, and components are in a unique position to provide expertise, resources, and support to develop a standard project management curriculum to serve K-12 education needs. Until project management practitioners take action to address this growing need, our youngest project managers will continue to struggle through the increasing project load they face in school and miss the unlimited potential of self-directed learners who have the confidence to take on more challenging projects, and ultimately limit the innovative potential of our future generations.

About the Author

Author, Kim Liegel has more than thirteen years of professional project management experience, with several world-class companies including Nike and Oracle. She has put her own project management skills to use in raising hundreds of thousands of dollars for United Way, managing multi-million dollar software development projects, and coordinating conferences and summit events for some of the world's largest financial institutions.

Currently, Kim Liegel is an independent project management practitioner and instructor, providing consulting and training services to businesses and organizations in the Eugene, Oregon area. She is a certified Project Management Professional, currently serving as volunteer leadership to the PMI Education and Training SIG as Vice-Chair of Communications.

Most recently, Kim Liegel has directly applied the principles from her successful project management career into *Make It Happen! Step-by-Step Project Success*, the first book of its kind to offer basic project concepts and skills designed specifically for kids 9-15.

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