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A History of Peer-Led Team Learning
1990-2012
A.E. Dreyfuss

Peer-led Team Learning has roots in concepts of active engagement in learning for students in higher education. P. Uri Treisman's (1985) dissertation at the University of California, Berkeley, demonstrated that students studying Calculus together were more successful in learning the material than students studying alone. In the late 1980's Treisman was invited to give a talk about his findings at the City College of New York (CCNY) of the City University of New York (CUNY) and **Joseph Griswold**, a professor of Biology at CCNY, invited **David Gosser**, a professor in the Chemistry Department, to attend the talk.

David Gosser had been frustrated by the low numbers of students passing his General Chemistry courses with A, B, or C grades, and Treisman's suggestion of having students work in groups inspired him. He applied for a grant from the National Science Foundation (NSF) to write materials for Chemistry "workshop" sessions, so-called from Treisman's naming of the group work in Calculus as "Workshop Mathematics." The grant proposal was submitted with **Michael Weiner** and **Art Woodward**, senior professors in the CCNY Chemistry Department. The latter, who was considering retirement and was not sure he wanted to be part of the grant submission, discussed the proposal idea with his wife, **Dore Woodward**. She thought it would be a good idea, and suggested that students who had recently passed the course could help the students in the "workshops" attached to the course.

That first NSF grant for the development of materials in "Workshop Chemistry" was awarded in 1991. Workshops, separate from lecture, were organized by professors and led by students who had successfully passed the course with an "A" or "B" grade and who were recruited to "lead" the students in groups of six to eight in learning the course material, simultaneously testing the Chemistry materials written for group work. A second NSF grant followed in 1994, to expand "Workshop Chemistry" to CUNY community colleges.

The National Science Foundation was concerned about the state of teaching in chemistry, and in 1994 put out a Request for Proposals (RFP) for chemistry initiatives. David Gosser, with Chemistry Department colleagues Michael Weiner and **Stanley Radel**, applied with "Workshop Chemistry." Initial collaborators at other campuses included **Michael Golde** at the University of Pittsburgh, Pennsylvania, and **Jack Kampmeier** and **Vicki Roth** at the University of Rochester, New York. The topic of Teacher Preparation was introduced, and development of more formal problem-solving manuals in chemistry was undertaken. Collaborators included **Victor Strozak** and **Tony Nicolas** at New York City Technical College, CUNY, **Ellen Goldstein** at CCNY (a learning specialist), and **Pratibha Varma-Nelson**, then at St. Xavier University in Chicago.

In 1995, of the five collaborative grants awarded for chemistry initiatives by NSF, the "Workshop Chemistry Curriculum" was one. A "National Visiting Committee" (NVC) was appointed and **Michael Gaines**, a biologist from the University of Miami (Miami, Florida), was named Chair. The role of the NVC was to meet

annually with the project leadership to review progress and suggest strategies and course corrections if needed. An external evaluator, **Leo Gafney**, was engaged to evaluate the project's results.

Part of the activities of the "Workshop Chemistry Curriculum" grant (1995-2000) was extensive dissemination of the model through presentations at conferences, and special workshops on incorporating the Workshop Chemistry model. Among those who became interested were faculty in two coalitions that were funded to adapt the Workshop model through NSF's "Adaption and Adoption of Workshop Chemistry" funding. These NSF grants funded the "MACK" group (1998-2001) headed by **Mark Cracolice** at the University of Montana (Missoula, Montana); **Madeline Adamczeski** at American University (Washington, D.C.); **James Reed** at Clark-Atlanta University (Atlanta, Georgia); and **Joseph Wilson** at the University of Kentucky (Lexington, Kentucky). The other coalition (1999-2002) was comprised of **Jerry Sarquis**, Miami University (Ohio); **Dennis Bartow**, Prince George's Community College (Maryland); **Esther Gibbs**, Goucher College (Maryland); **Lucille Garmon**, University of West Georgia; **Brian Gilbert**, Coastal Carolina University (South Carolina); **Bob Blake**, Indiana University/Purdue University at Indianapolis (IUPUI; Indiana); **Charles Spuches** and **Garrison Lewis**, State University of New York (SUNY) College of Environmental Science and Forestry (Syracuse, New York).

This "Workshop Chemistry" instructional model worked best when the campus program observed certain guidelines. Through extensive evaluation of many PLTL programs, using focus groups and multiple interviews, Leo Gafney codified these guidelines, which were defined as the **Six Critical Components**, summarized as follows:

1. The Peer-Led Workshop is integral to the course.
2. Instructors (faculty & teachers) are involved in the selection of materials, training and supervision of peer leaders, and they review the progress of Workshops.
3. Peer leaders are selected, trained and supervised to be skilled in group work as facilitators.
4. Workshop materials are appropriately challenging, directly related to course methods of assessment, designed for small group work.
5. The Workshops are scheduled and held once a week for two hours, contain six to eight students per group, in space suitable for small-group activities.
6. The Peer-Led Team Learning program is supported by the department and the institution with funds, course status and other support so that the method has the opportunity to be adopted across courses and disciplines.

With a clear definition of the model and as it spread to other disciplines, a new name was adopted to broaden the impact: **Peer-Led Team Learning**. This new name was used as the title of two National Dissemination grants, again funded by the NSF (1999-2006), to develop the model in other science, technology, engineering, and mathematics (STEM) fields, both in four-year and in two-year colleges. David Gosser now had a team that included Joseph Griswold, Ellen Goldstein, at CCNY; Mark Cracolice, Michael Gaines, Jack Kampmeier, PratibhaVarma-Nelson, Victor Strozak, Dennis Bartow, and Madeline Adamczeski. Leo Gafney continued as the External Evaluator.

The first Annual Conference of the PLTL Project was held in August 1999 at the University of Montana. **A.E. Dreyfuss**, a Learning Specialist, was hired as Project Manager in September 1999. The first issue of *Progressions*, a quarterly project newsletter, was published in the Fall of 1999. In 2000, the PLTL Project sponsored several major conferences: Leadership training (University of Rochester, June); dissemination to new disciplines (Oregon State University, Portland, OR, August); and the Annual Conference in Newark, NJ

(October). A conference of biologists was held in January 2001 at the University of Miami to promote the development of biology modules. Annual conferences were held at Goucher College (Towson, MD) in 2001; University of Montana (Missoula, Montana) in 2002; at CCNY (New York, New York) in 2003 and 2005 through 2009; Northeastern Illinois University, Chicago, Illinois in 2004; and at Morehouse College (Atlanta, GA) in 2010. Two special conferences on leader training were held at the University of West Georgia (Carrollton, GA, April 2001) and at the University of Houston, Downtown (Houston, Texas, April 2006). In addition, many smaller local and regional workshops were held between 1999 and 2010. The “Workshop Chemistry” website was redesigned as “Peer-Led Team Learning” by **Rob Gosine** and **Andrei Lalla**, subsequently by **Olta Buka** and later by **Chinedu Chukuigwe**, former Peer Leaders at CCNY.

Two important aspects of the National Dissemination grant phase were managed by **Pratibha Varma-Nelson** (who was first at St. Xavier University, from 1979-2002, then at Northeastern Illinois University, from 2002-2008). The first was the Workshop Program Associate (WPA) program, providing “mini-grants” with awards of \$5,000 per practitioner who wanted to implement PLTL in a course. This “seed money” could also be used for the development of workshop units in disciplines (also referred to as “modules”). Ninety-two awards were distributed in the course of the Dissemination grants. Materials in physics, mathematics, and biology were developed and piloted on various campuses. The second component managed by Pratibha Varma-Nelson was serving as the PLTL spokesperson to other NSF projects. This involved organizing the annual PLTL three-day “Chautauqua” professional development workshops, held in Philadelphia, Pennsylvania, and Pasadena, California. She also served as a senior partner and the organizer for the PLTL component of the Multi-Initiative Dissemination of the five systemic change initiatives: workshops were organized around the country where representatives from each grant presented their project and faculty from campuses in the region attended to find out more about how to adopt the various initiatives. Pratibha Varma-Nelson (now at Indiana University/Purdue University at Indianapolis – IUPUI) and Leo Gafney are the authors of *Peer-Led Team Learning: Evaluation, Dissemination and Institutionalization of a College Level Initiative* published by Springer (2008).

Because Peer Leaders need to be trained for their role (see Critical Component #3), “learning specialists” helped develop the PLTL model working with content specialists. The learning specialists brought pedagogical knowledge to the training of peer leaders. The importance of this contribution was significant: without training, “peer leaders” acted as “mini-professors,” lecturing students. How good students became effective “peer leaders” was by having them engage students in discussing the course material and dealing with various aspects of group dynamics. Learning specialists who provided pedagogy on collaboration included Vicki Roth (University of Rochester), Ellen Goldstein (CCNY), **Gretchen Marcus** (Goucher College), and **Vivian Snyder** (University of the Pacific, Stockton, California). Training materials were designed incorporating knowledge of successful group practices such as cooperative learning (Johnson & Johnson; Slavin; Aronson), supplemental instruction (SI) (Martin), other collaborative learning methods, and incorporating concepts of chemistry education.

The materials that started out as problem sets for chemistry courses were further developed as Prentice Hall (now Pearson) expressed interest in publishing the manuals. A “Peer-Led Team Learning” series of five books was published in 2001, and included

1. *A Guidebook* (explaining the PLTL model) authored by David K. Gosser, Mark S. Cracolice, J.A. Kampmeier, Vicki Roth, Victor S. Stozak, and Pratibha Varma-Nelson
2. *Handbook for Team Leaders* (for Peer Leaders), authored by Vicki Roth, Ellen Goldstein, and Gretchen Marcus

3. *General Chemistry*, authored by David K. Gosser, Victor S. Strozak and Mark S. Cracolice
4. *Organic Chemistry*, authored by Jack A. Kampmeier, Pratibha Varma-Nelson, **Donald K. Wedegaertner**, and **Carl C. Wamser**
5. *General, Organic & Biologic Chemistry*, authored by Pratibha Varma-Nelson and Mark S. Cracolice

The National Dissemination grants expanded with the addition of a Community College Supplement in 2000 that provided supplemental funding to disseminate the PLTL model in community colleges. This initiative was led by Victor Strozak, Dennis Bartow, and Madeline Adamczeski who was now at San Jose City College, California. A teacher preparation component was led by Ellen Goldstein and Michael Weiner at CCNY. This effort emerged from the observation that peer leaders were often strong science students who became interested in teaching. Ellen Goldstein and later AE Dreyfuss developed this component by videoconferencing the training sessions at CCNY to three CUNY community colleges and a comprehensive college where both a science and a mathematics faculty member had incorporated workshop in their course, and the technology was used to train the peer leaders. Those students interested in teaching would then take courses at CCNY to become certified to teach. Ellen Goldstein also helped disseminate PLTL with Vicki Roth at an annual conference in the U.K. from 2001 to 2005.

By the end of over 15 years of funding from the National Science Foundation (1991-2006), Peer-Led Team Learning workshops have been implemented at well over 150 campuses in the United States. Where only one faculty member implemented workshop, it often did not survive as a course component once that person changed positions, or went to another institution, or retired. Where collaborations and institutional support were garnered, PLTL has grown roots and is part of how a course is taught, especially the “gateway” courses, those that traditionally have proven difficult for incoming students. PLTL workshops help students through their understanding of their responsibility for their own and others’ learning, and have helped hundreds of peer leaders to develop leadership and communication skills, helping them to grow in knowledge and confidence. Many studies have demonstrated that students’ performance in courses improves. More recent studies have demonstrated benefits to peer leaders as well.

Materials for workshops in other disciplines were developed during the National Dissemination grant project. Joseph Griswold and Michael Gaines wrote modules for Introductory Biology, working with **Charles Mallery** and **David L. Wilson** (University of Miami, Miami, Florida), **Diane Baronas-Lowell** and **Kim Van Vliet** (Florida Atlantic University, Jupiter, Florida), **Beth Gaydos** (San Jose City College, San Jose, California), and **Dean Stetler** (University of Kansas, Lawrence, Kansas). The modules reflected a consensus on core topics important for higher-level courses in the biological sciences. **Nichole McDaniel** (Bronx Community College, CUNY) developed modules for first-semester Anatomy and Physiology. In mathematics, **Janet Liou-Mark** (New York City College of Technology, CUNY), **Mitsue Nakamura** (University of Houston-Downtown), **Peggy Beck** (Prince George’s Community College) and **June Gaston** (Borough of Manhattan Community College, CUNY) wrote modules for college algebra and pre-college algebra. A team at the University of Maine, Orono, **Paula Drewniansy**, **Sue McGarry**, and **Jen Tyne**, wrote modules for Calculus I, as did another team, **Abdelkrim Brania** and **John Merkel**, at Morehouse College (Atlanta, Georgia). Leader training modules for faculty and Peer Leaders were written by a team at the University of Maine, Orono, which included **Francois G. Amar**, **Mitchell Bruce**, **Barbara Stewart**, and **Hali Fortin** (see [Modules](http://www.pltlis.org) at www.pltlis.org).

The PLTL model continues to develop and the number of adopters continues to increase. In computer science, **Ongard Sirisaengtaksin**, at the University of Houston-Downtown, is working with colleagues in the Computing Alliance for Hispanic-Serving Institutions (CAHSI) to develop workshops in computer

science courses at Hispanic-Serving Institutions (HSI) from Florida to California. An earlier coalition headed by **Susan Horwitz** at the University of Wisconsin developed workshops in computer science with the intent of attracting more women to the discipline; modules on learning Java were written by **Barbara Ryder** (formerly at Rutgers University) and **Pradip Hari** (Rutgers University, New Jersey). **Michael Loui** and colleagues are using workshops in engineering courses at the University of Illinois, Urbana-Champaign. High school students in New York City are learning algebra, biology (Living Environment), and other courses in “Peer-Enabled Restructuring of the Classroom” (PERC classrooms with the Math and Science Partnership in New York City (MSPinNYC) project. Directed by **Pam Mills** (Hunter College, CUNY) the PERC project is demonstrating gains in student performance in New York City high school math and science courses through the use of groups led by a Teaching Assistant Scholar (TAS), a high-school student who has recently taken the course.

PLTL workshops are developing new systems of delivery. PratibhaVarma-Nelson and colleagues at IUPUI have developed Cyber Peer-Led Team Learning (cPLTL.iupui.edu) in chemistry with NSF funding and have tested its transferability working with biologists **Nancy Pelaez** at Purdue University and Thomas Pitzer at Florida International University. The research and dissemination of the cPLTL model was funded by Next Generation Learning Challenges (NGLC) Wave I. Varma-Nelson was also a founding co-PI of the Center for Authentic Science Practice in Education (CASPIE), headquartered at Purdue University, which incorporates PLTL workshops for laboratory courses (<http://www.purdue.edu/discoverypark/caspie/>).

On September 17, 2011 at Morehouse College in Atlanta, Georgia, a group of Peer-Led Team Learning (PLTL) practitioners formed the **Peer-Led Team Learning International Society (PLTLIS)**. The practitioners at this initial meeting – faculty, learning specialists, and peer leaders – represented the following academic disciplines: biology, biophysics, chemistry, computer science, mathematics, physics, psychology, adult learning, biology education, mathematics education, and science education. The Peer-Led Team Learning International Society was incorporated in April 2012. The Inaugural Conference was held May 17-19, 2012 at New York City College of Technology, City University of New York, in Brooklyn, New York.

The mission of PLTLIS is to foster student learning through peer-led teams by supporting practitioners and institutions. The vision of the Society is to make PLTL integral to excellent educational practice. As demonstrated by the history of the development and growth of PLTL, the practice of PLTL can be sustained and expanded through collaborations among faculty, learning specialists, peer leaders, and students.

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The National Science Foundation’s support for Peer-Led Team Learning has been instrumental for the success of the growth of this initiative that draws on the “untapped resource” of students as Peer Leaders, as noted by David Gosser, who, with colleagues, first developed the “Workshop Chemistry” model for peer problem-solving, at the City College of New York, CUNY. PLTL’s development as a curricular initiative has expanded in part through NSF’s grant awards to campuses that have included the PLTL model.

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