



THE PEER-LED TEAM LEARNING INTERNATIONAL SOCIETY
PROCEEDINGS OF THE INAUGURAL CONFERENCE
MAY 17-19, 2012
NEW YORK CITY COLLEGE OF TECHNOLOGY OF
THE CITY UNIVERSITY OF NEW YORK
BROOKLYN, NY 11201-2983

**From Peer-Assisted Learning to Peer-Led Team Learning at City Tech:
An historical overview**

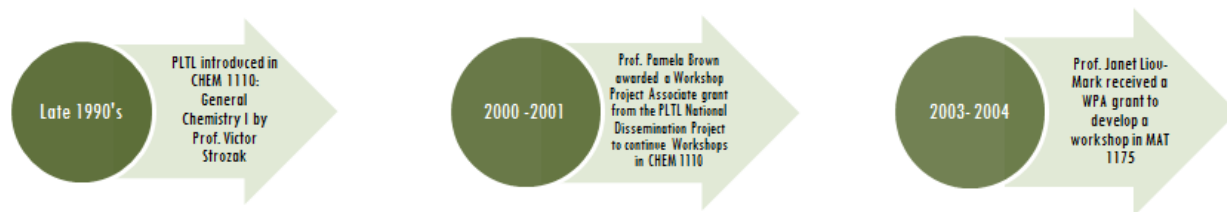
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Abstract

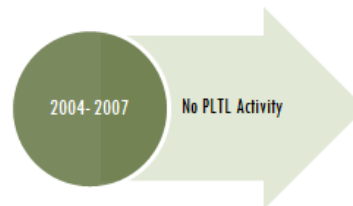
A chronological account of the institutionalization of Peer-Led Team Learning (PLTL) at New York City College of Technology is documented in this paper. What started as a Peer-Assisted Learning project has now emerged as an established viable PLTL instructional method of learning. Through forming partnerships with existing organizations, capitalizing on small funding opportunities, and attaining commitment from dedicated administrators and faculty, PLTL mathematics workshops have thrived over the last few years and PLTL workshops have continued to expand to other science and engineering disciplines.

Introduction

The Peer Led Team Learning (PLTL) instructional model was first used in the mid 1990's at New York City College of Technology (City Tech) by Professor Victor Strozak (now retired), who introduced and implemented PLTL Workshops in Chemistry. To continue this initial effort, Professor Pamela Brown from the same department received a Workshop Project Associate (WPA) grant from the PLTL National Dissemination Project in fall 2000 to support the General Chemistry workshops.

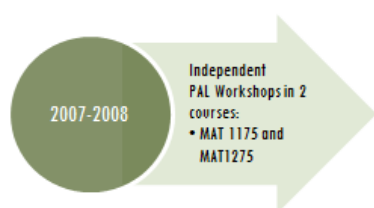


It was not until spring 2003 that the workshop model was expanded to mathematics. Professor Janet Liou-Mark was also awarded a WPA grant to develop workshops for Fundamentals of Mathematics (MAT 1175), the first credit-bearing mathematics course offered at the college. A set of modules for MAT 1175 was created, and an optional workshop was piloted for one year. After the grant ended, workshops remained inactive from 2004 to 2007 due to lack of funding to support peer leaders. Only in fall 2007, when new external funding became available, were the PLTL mathematics workshops offered again. This also had the effect of prompting the extension of workshops to science and engineering disciplines.



Transitioning from a Peer-Assisted Learning (PAL) Project to a PLTL Program

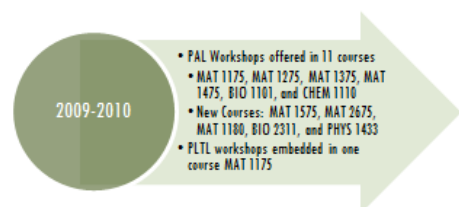
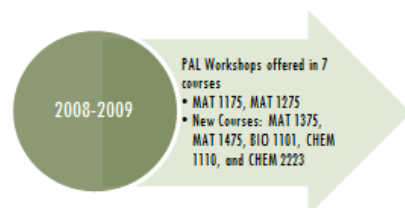
Since its inception in 2003, the project was known as the Peer Assisted Learning (PAL) program, a variation of the PLTL instructional model. At that point, City Tech was only able to integrate four of the six critical components of the PLTL model: (1) the peer leaders are trained in a one-credit course; (2) the workshop modules (materials) are both fundamental and challenging; (3) the organizational structure supports workshops; and most importantly, (4) there is institutional support at the administration level. Having workshops as an integral part of the course and having faculty working closely in the program were a challenge. Although workshops were not an integral part of the course, and thus optional, a few instructors supported the program by providing additional incentives (such as extra credit) for students to attend.



The inauguration of the PAL workshops began with one optional workshop piloted with a Precalculus (MAT 1375) course in 2006. Formal workshops did not begin until 2007 when Fundamentals of Mathematics (MAT 1175) and College Algebra and Trigonometry (MAT 1275) workshops were advertised to the college community. Even with only four of the critical components in place, the PAL workshops were

gradually attaining recognition. This accomplishment was mainly due to the support from the administration and the provision of local funding to support the program. Professor Pamela Brown, now Dean of the School of Arts and Sciences, provided the resources needed to continue and expand the PAL workshops through a National Science Foundation STEP grant. Dr. A.E. Dreyfuss was hired as the project manager of the STEP grant, and her expertise in the PLTL model was an additional advantage in establishing the program at City Tech.

In 2008, a partnership with the institution's Black Male Initiative (BMI) under the leadership of Professor Reginald Blake was formed. As the only STEM-focused program within the City University of New York (CUNY), City Tech BMI's vested focus was on improving the academic achievement in the STEM disciplines for not only African-American males, but also all students regardless of gender and ethnicity. With the additional funding to support the hiring of peer leaders, workshops expanded to seven courses. Professors Tony Nicolas and Diana Samaroo restarted the Chemistry workshops, namely in General Chemistry I (CHEM 1110) and Organic Chemistry I (CHEM 2223). Professor Ralph Alcendor promoted the Biology I (BIO 1101) workshops. Workshops for mathematics expanded to include Precalculus (MAT 1375) and Calculus I (MAT 1475), totaling seven mathematics and science courses with an optional workshop component.



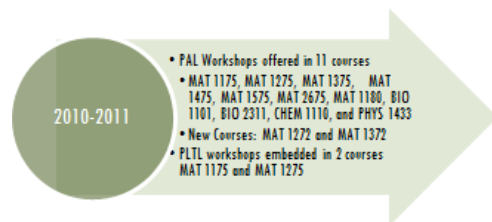
Only in 2009 was the first PLTL course with a mandatory one-hour workshop offered. The four-credit Fundamentals of Mathematics (MAT 1175) course had forty students and four peer leaders facilitating the workshops. An institutional Perkins grant was awarded and funding was used to support these peer leaders. Subsequently, Professors Liou-Mark, Dreyfuss, Blake, and Reneta Lansiquot received a Mathematical Association of America (MAA)

Tensor Foundation grant which supported programs and activities for women majoring in mathematics. This

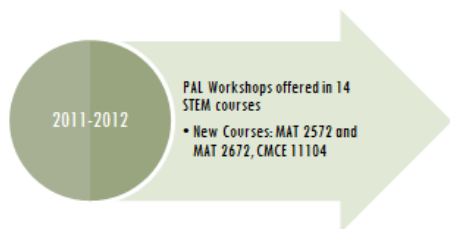
award assisted with stipends for female peer leaders majoring in applied mathematics. The City Tech's BMI program continued to provide stipends for peer leaders facilitating workshops in the sciences and higher-level mathematics.

In addition to the PAL optional workshops developed for the six courses, PAL workshops for five additional courses were created. Professor Ralph Alcendor supervised the Biology I (BIO 1101) workshops and organized a Human Anatomy and Physiology I (BIO 2311) workshop, and Professor Lufeng Leng organized a Physics 1.2 (PHYS 1433) workshop. A team of mathematicians, Professors Neil Katz, Satyanand Singh, and Arnavaz Taraporevala, created modules for Calculus II (MAT 1575), and they actively promoted the optional workshops in their classes. Ms. Lori Younge, an Applied Mathematics major and experienced peer leader, used her internship credits to develop the Mathematics Concepts and Application (MAT 1180) modules, which she piloted.

In 2010, a second PLTL course with an embedded (mandatory) one-hour workshop was offered in a College Algebra and Trigonometry (MAT 1275) course. Awarded a second year, the Perkins grant allowed more funding to be allocated towards the foundational mathematics courses. A second round of the MAA Tensor foundation grant was also approved, which continued to support females peer leaders majoring in Applied Mathematics.



The BMI program continued to support the other peer leaders. In Biology, Professors Rachele Arrigoni-Restrepo, Niloufar Haque, Armando Solis, Maria Ter-Mikaelian, and Tatiana Voza coordinated the BIO 1101 and BIO 2311 workshops. Professor Diana Samaroo continued workshops in her CHEM 1110 course, and Professor Lufeng Leng in her PHYS 1433 class. Professor Arnavaz Taraporevala supported the formation of workshops for a series of Statistics workshops specifically, Statistics (MAT 1272) and Statistics and Probability (MAT 1372).



A record high of 14 courses that included either mandatory or optional workshops was reached in 2011. Professors Laura Ghezzi and Sandie Han remain committed to the MAT 1175 PLTL embedded courses, and Professors Janet Liou-Mark and Lin Zhou in the MAT 1275 PLTL embedded courses. Professor Melanie Villatoro from the Civil Engineering Technology/Construction Management department embraced the

PLTL model, and she started workshops in a Statics and Strength of Materials course (CMCE 1104). Additionally, the Statistics with Probability I and II (MAT 2572 and MAT 2672, respectively) workshops were prompted by the students requesting a need for additional help in these high-level courses.

Peer Leader Training

Peer Leader Training at City Tech has evolved over the years. The initial peer leader training began with students enrolling in a one-credit independent study course taught by Dr. A.E. Dreyfuss. The course supported a forum to study group facilitation issues related to learning. The class met once a week for one hour. Weekly reflective journals revealing the development of workshop practices were required and an educational research project based on peer leader practice was presented at the end of the semester at the institution's Honors and Emerging Scholars Poster Presentation by each first-time Peer Leader.

The training course was officially accepted as a required course for students majoring in Mathematics Education. Formally known as the Peer Leader Training in Mathematics (MEDU 2901), this one-credit

course was offered for the first time in Fall 2011 and continues to be offered every semester to train new peer leaders.

The benefits to the peer leaders have exceeded their expectations. This engaging experience of peer leading has expanded their cultural, social, and academic understanding, as reflected in two comments:

My experience as a Peer Leader has allowed me to meet, interact, and work with students from various cultural backgrounds. Being able to help first-year student, not only in Mathematics, but also in answering general college questions, concerns, and challenges or helping students transition successfully to college, certainly felt rewarding. Also, taking the peer-leading course has fully equipped me with the tools and resources I needed to be an effective peer leader. Some of the great benefits of being a peer leader are: improved communication skills, increased tolerance towards people of different cultures and individual learning styles, and increased desire to help motivate more of my peers to succeed especially in the STEM fields. The overall concept of helping others help themselves and to see mathematics in a different way is absolutely amazing!

~Sereta Scott

Being a peer leader has absolutely contributed to my ongoing social, academic and professional development. I've learned about group dynamics and how to facilitate a group of people. Working in pairs and in groups has sharpened my listening skills. I have also been made aware of learning styles and have identified my own. This in turn has helped me to tweak my study habits for better concentration and retention of the information presented. I loved being a peer leader because it provided me with an environment that fostered my ability to engage people and make them feel comfortable, especially with a subject that some of the students just do not like. I also liked being a peer leader because I could see that what I was doing helped students. If it was not effective, I probably would not have continued as a peer leader. I do not have any regrets about this peer leader experience. Would I be a peer again? I sure would. As I move into a teaching career, I am definitely considering how I may eventually integrate group collaboration such as the PLTL model in my classroom.

~Lori Younge

City Tech continues to strive towards the implementation of the PLTL model in its STEM courses. The successful pass rates resulting from the foundational mathematics courses with workshops serve as a strong base for institutional support. Grant proposals and programs have continued to add PLTL as an activity to promote student achievement in STEM, thus providing the necessary funding for the peer leaders. Moreover, faculty have been the keystone of the program, consistently gracious with their time and effort in promoting and improving the program. With the essential partnerships established at the critical levels, a promising viable academic support structure for student success will continue to expand.

Acknowledgments

The PAL/PLTL Project was partially supported by NSF STEP Grant #0622493, the Black Male Initiative program, MAA Tensor Foundation Women and Mathematics grant, CUNY OAA Improving Undergraduate Learning Outcomes in Mathematics grant, CUNY CUE grant and Perkins. The authors would like to thank Dr. Pamela Brown and all the faculty members for their dedication to the project.

Cite this paper as: Liou-Mark, J., Dreyfuss, A.E., Yuen-Lau, L., Lu, C., Scott, S., Young, J.A., Younge, L. (2013). From peer-assisted learning to peer-led team learning at City Tech: An historical overview. *Conference Proceedings of the Peer-Led Team Learning International Society*, May 17-19, 2012, New York City College of Technology of the City University of New York, www.pltlis.org; ISSN 2329-2113.