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**CREATING A LABORATORY COMPONENT TO ALIGN WITH PLTL WORKSHOPS  
IN CIVIL ENGINEERING TECHNOLOGY**

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The Construction Management and Civil Engineering Technology (CMCE) Department at NYC College of Technology has implemented PLTL in Statics since 2012. Statics is a freshman engineering course which provides an introduction to the concepts of force, equilibrium, section properties, load pattern distribution and equilibrium. Since implementation of PLTL, the percent of students receiving a grade of C or better has increased continuously from 52.4% in 2012 to 79.5% in 2014; The withdrawal rate has decreased steadily from 33 to 17%. Recognizing the success of the program in Statics, the CMCE Department increased the class hours from 3 hours to 4 hours to include the PLTL workshop as a laboratory component of the course. Beginning fall 2015, all CMCE students would benefit from participation in the workshops in statics. New elements were piloted to incorporate visual and hands-on activities to align with the workshops.

New York City College of Technology, "City Tech," is the designated senior college of technology within the 24-unit City University of New York (CUNY), the largest urban public university system in the nation. Fall Semester 2014 student enrollment was 17,374, of whom 36% attended part-time. Forty-four percent (44%) are female and fifty-six percent (56%) are male. Thirty-one percent (31%) of students self-identified as Black (non-Hispanic), 35.6% as Hispanic, 20.6 % as Asian/Pacific Islander, 11.1% as White, 0.5% as Native American, and 1.2% as Other. Fifty-eight percent (58%) reported a household income of less than \$30,000. Eighty percent (80%) of incoming first-year students and 65% of returning students received need-based financial aid. Sixty-seven percent (67%) are the first in their families to attend college. The student body reported 138 different countries of origin; countries of origin of faculty also span the globe. Twenty-five percent (25%) of students reported working 20 or more hours per week. (Office of Sponsored Programs)

The Department of Construction Management and Civil Engineering Technology (CMCE) offers associate degree programs in Civil Engineering Technology (CV) and Construction Management Technology (CM) and a baccalaureate degree in Construction Technology (CT). All CMCE students are required to complete a Statics (CMCE 1115) course as a prerequisite to their sequence of design courses which includes Strength of Materials, Steel and Concrete Design. The Statics course provides an introduction to the concepts of force, equilibrium, section properties, load pattern distribution and equilibrium. The average percent of students earning a C or better from fall 2007 to fall 2011 was about 54% and the average percent of students withdrawing from the class was about 28%. In response to the

low grade distributions and high withdrawal rates, the department implemented Peer Led Team Learning (PLTL) in spring 2012.

#### Peer-Led Team Learning (PLTL)

PLTL consists of students working in small groups under the guidance of a trained peer leader during a one- hour weekly workshop. The role of the peer leader is to implement various techniques in order to engage the entire group without providing students with the solutions. Six critical components have been identified to ensure a successful program: integrating workshops to the course, strong faculty involvement, formal training and supervision of peer leaders, adequate challenging workshop materials, organizational components which promote learning, and institutional support (Wilson and Arendale 2011, Schray et al., 2009, Liou-Mark et al., 2010, Kang et al., 2013).

In spring 2012, the CMCE department implemented a pilot PLTL program in Statics. The PLTL program consisted of one-hour workshops offered outside of class time, before or after the scheduled lecture hour. Participation was strongly encouraged, however could not be mandatory because workshop took place outside of required meeting times. The workshops were led by trained Peer Leaders and since its implementation, the percent of students receiving a grade of C or better increased continuously from 52.4% in spring 2012 to 79.5% in fall 2014. The withdrawal rate decreased steadily from 33% in spring 2012 to 17% in fall 2014. Due to the success of program, the department decided to incorporate PLTL as a laboratory component in all Statics sections. Effective fall 2015, the weekly class hours were increased from 3 hours to 4 hours to allow for imbedded workshops. During spring 2015, three laboratory elements were tested for incorporation into workshops. The three elements were iClickers, MDSolids, and the PASCO Structures System.

#### *iClicker*

The iClicker system was used to encourage group participation. The iClicker is a radio frequency device that allows a student to respond anonymously to questions in class, providing real time data to help the instructor assess topic understanding. The real time data was used as a guide by the Peer Leaders, allowing them to focus on the topics of concern during the workshop. The Peer Leaders noted that the students were discussing and sharing answers during this exercise and although the intention was for individual assessment, the outcome was an environment of discussion and problem-solving; fundamentals of the PLTL workshops.

#### *MDSolids*

MDSolids is an educational software package used for introductory mechanics of materials. The software provides students with an intuitive interface that helps them visualize the nature of internal stresses and deformations and provides an easy-to-use means of investigating a greater number of problems and variations. Students benefit from the three dimensional modeling and were able to confirm their hand calculations using the software.

#### *PASCO Structures Systems*

The PASCO Structures System supports trial and error construction with the addition of state-of-the-art technology for electronic measurement. The Load Cell & Amplifier Set enables load cells used for

tension and compression measurement to be built into the structure. This exercise allowed each group to build the structure in three dimensions and see the members act under various loading conditions.

Discussion and Conclusion

The purpose of piloting these three elements was to determine their efficacy in helping students understand the concepts introduced in lecture. The existing workshops have contributed to an improvement in student performance. These three elements enhance the workshop experience by increasing interaction and participation, visualization, and exposure to software applications. A survey was distributed to participants exposed to these three elements. Figures 1 and 2 show the participants' responses to the survey. Student satisfaction with the elements confirmed the hypothesis that they would be an aid in understanding and reinforcing the course topics.

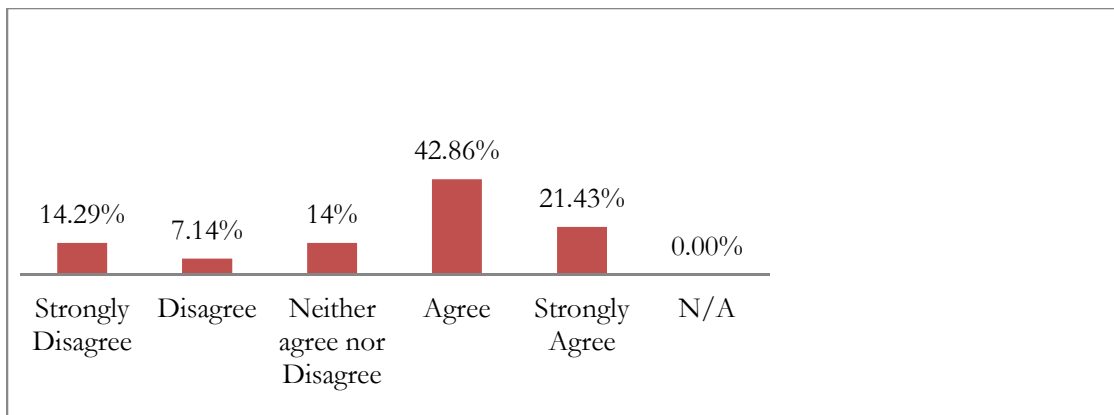


Figure 1. Survey Question: The workshop activities stimulated my learning.

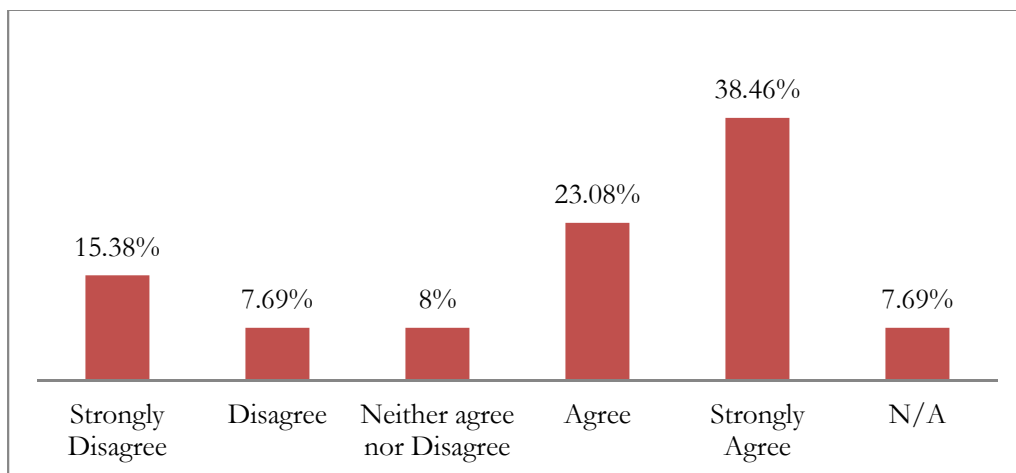


Figure 2. Survey Question: The workshop was a good way for me to learn this content.

## References

- Kang, Y., Matsell, L., & Nakamura, M. (2013). Implementation of PLTL in a Freshman Biology Course at the University of Houston-Downtown. *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.
- Liou-Mark, J., Dreyfuss, A.E., and Younge, L. (2010). Peer Assisted Learning Workshops in Precalculus: An Approach to Student Success. *Mathematics and Computer Education*, 44, 249-260.
- Office of Sponsored Programs. <http://facultycommons.citytech.cuny.edu/index.php/sponsored-programs/institutional-description/>. Accessed August 14, 2015.
- Schray, K., Russo, M.J., Egolf, R., Lademan, W., & Gelormo, D.. (2009). Are In-Class Peer Leaders Effective in the Peer-Led Team-Learning Approach? *Journal of College Science Teaching*, 38, 4, 62-67.
- Wilson, W.L., & Arendale, D.R. (2011). Peer educators in learning assistance programs: Best practices for new programs. *New Directions for Student Services*, 133, 41-53.

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