PEER-LED TEAM LEARNING IMPLEMENTATION

PLTL AND UNIVERSAL DESIGN FOR INSTRUCTION: INVESTIGATING WIDER ACCESS FOR STUDENTS WITH DISABILITIES

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Successful for Some, but Not All

Washington University in St. Louis (WU) launched its PLTL program with chemistry groups in 2001. Since then, this voluntary academic service has expanded to include calculus and physics courses. Participating students have consistently achieved nearly half a letter grade higher in the associated science or math course compared to students who do not participate. Course evaluations have also reflected high levels of satisfaction with the popular PLTL experience (Hockings, DeAngelis, & Frey, 2008).

WU undergraduates with learning disabilities (LD) and Attention-Deficit/Hyperactivity Disorder (ADHD) must meet the same admissions criteria as peers without disabilities. They also demonstrate comparable paths of academic preparation in high school. Despite these similarities, WU students with disabilities who participated in PLTL since 2001 consistently achieved lower course grades than peers without disabilities. Students with LD and/or ADHD comprise over half of the approximately 5% of WU undergraduates with disabilities. Nationally, students with these disabilities also constitute more than half of undergraduates with identified disabilities (Harbour, 2004). National Science Foundation (NSF) data indicate that students with disabilities pursue STEM majors less frequently than students without disabilities. (For more information, refer to (http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5482&org=EHR&from=home). At WU, students with disabilities also were found to migrate away from STEM majors at higher rates than students without disabilities.

A team at WU's *Cornerstone: The Center for Advanced Learning* obtained a $100,000.00 NSF grant to create the Mastery Peer-Lead Team Learning (MPLTL) project. This group includes Dr. Robert Koff, Christine Street, Dr. Harvey Fields, Lisa Kuehne, and Larry Handlin. Grant funding partially supported the subsequent hiring of project manager, Dr. David Parker, and technology specialist, Dr. Michael Getty. Following a review of the literature, the team hypothesized that students with LD/ADHD may have been concerned about exposing their specific learning needs by asking questions or expressing confusion without "filters" during a session. In addition, the literature suggested that these students might find the highly verbal nature of the PLTL model and the courses' large lectures challenging due to their innate difficulties with information processing and executive functioning skills. Indeed, proficient problem solving involves the application of executive functioning skills such as self talk (or "silent speech") to metacognitively organize, carry out, and self-correct one's thinking when solving problems in areas such as chemistry, mathematics, and physics (Depape, Hakim-Larson, Voelker, Page, & Jackson, 2006). Could the PLTL model be adapted without

altering its essential components to create a more successful learning environment for students with disabilities?

Creating MPLTL

Peer leaders in chemistry and calculus with at least one semester of training and experience and the recommendation of their content coordinators were interviewed for roles as MPLTL peer leaders. In Spring 2008, two chemistry and two calculus peer leaders were hired to launch the program. One chemistry and one calculus peer leader continued in Fall 2009; two other peer leaders were recruited using the original criteria. The MPLTL project modified the PLTL model by assigning two peer leaders to the same group, although only one peer leader facilitated a given session. Paired peer leaders took turns running the group one week and then observing it the following week. Another adaptation to the traditional PLTL model involved forming MPLTL groups that only included students with LD and/or ADHD. This decision was based on the belief that it would be easier to learn about students' needs and apply the enhanced MPLTL training in groups where all students had disabilities. We also wanted to explore whether students with these "hidden" disabilities felt more comfortable asking questions or identifying areas of confusion in a somewhat homogenous group. The MPLTL groups covered the same problem sets and moved at the same pace as the other PLTL groups and the peer leaders used the same techniques to guide group learning.

The MPLTL peer leaders participated in the weekly training all PLTL peer leaders received through WU's Practical Applications of Academic Mentoring (PAM) course. In addition, MPLTL leaders received two additional forms of training: a one-day workshop prior to the start of PLTL sessions and a weekly one-hour seminar. Project peer leaders received an additional stipend through the grant's funding structure to compensate for this additional time investment. Both forms of training were conducted by the first author and all training materials are posted on the project website (www.mpltl.org). The seminar introduced students to learning characteristics of college students with LD/ADHD as well as the Principles of Universal Design for Instruction (UDI). These principles, adapted and derived from the fields of architecture and product development, anticipate diversity in learning environments. Instructors can use the Nine Principles of UDI© to make instruction as proactively accessible to as many people as possible, including students with disabilities. For example, Principle 5 (Tolerance for Error) states, *Instruction anticipates variation in individual student learning pace and prerequisite skills.* MPLTL peer leaders were trained to write basic formulas on the board before starting a session and to offer a five minute break mid-way through it. Use of Principle 5 in this simple manner did not alter the PLTL model but minimized working memory demands on students who were there to learn better ways to *apply* the formulas and who often became restless after sitting for an hour. For more information about UDI, visit http://www.facultyware.uconn.edu/.

The weekly seminars allowed the MPLTL peer leaders to create a smaller community of practice within the PLTL community at WU. Each week, they debriefed on their observations of disability-related learning needs of students and discussed basic but powerful modifications to the PLTL techniques they had used. Their work was observed and "vetted" by the coordinator of WU's calculus PLTL program as well as a Cornerstone administrator with a Ph.D. in chemistry who oversees the training of peer mentors. A highly unique aspect of MPLTL involved peer leaders' creation and use of templates. A template was defined as "any learning tool that helps students better understand, retrieve, and apply course concepts, procedures, or formulas." Peer leaders used part of each seminar to create, discuss, and demonstrate written templates (e.g., a one-page chart of visual metaphors to help students remember chemistry concepts such as Hund's Rule and oxidation number determination) they then used during sessions. Peer leaders also created "self-talk" videos

in which they employed think aloud strategies while solving the types of problems students worked on in sessions. These videos were designed to explicitly model proficient problem solving behaviors. Students could adapt and internalize the peer leaders' cognitive strategies through repeated viewings. Both types of templates have been made available to all visitors on the project's website ("Program stems exodus," 2009).

A Website to Demonstrate and Disseminate

Web-based distribution of materials and research results has been an integral part of the MPLTL project from its inception. From a technological standpoint, this presented three principal challenges.

First, we realized that a Web-based distribution platform, especially for a project with multiple geographic centers as MPLTL is envisioned to be, must make all its authoring and maintenance tools fully Web-accessible themselves. Moreover, we anticipated needing to add to the ranks of trusted authors and administrators quickly. This ruled out one common (though increasingly less common) strategy, which would have been to buy and house a server at a single location, managing its content via popular desktop tools such as Macromedia Dreamweaver. Second, it was clear that on such an open, collaborative project, we would not be able to anticipate all the types of content and interactive capabilities that might eventually be called for. This ruled out creating the MPLTL project site as essentially a kind of blog (i.e. a 'web log') on a popular platform such as Blogger, Typepad, or Wordpress. It also ruled out any sort of closed, proprietary system such as Microsoft SharePoint. Third, we knew that we needed a very low-cost solution, given the constraints and administrative oversight associated with even the smallest expenditures on a federally funded project.

All these issues pushed us in the direction of a non-proprietary Web content management system. Such systems, chief among them Drupal and Joomla, are created, maintained, and documented by vast, distributed communities of many thousands of users. They are made available under a General Public License, which allows software to be freely distributed and copied but not modified except by the non-profit foundation that holds copyright. Our project is powered by the Joomla content management system (www.joomla.org). To this core, users in the vast Joomla community contribute thousands of add-on modules, most of them distributed free of charge.

In combination with a relatively low-cost hosting vendor, this solution enabled us to create a functioning site within a few days. In the months since then, we have added over a dozen new modules, allowing us to display statistical charts, enable moderated discussions among site visitors, distribute documents, and embed images and videos into featured content. From start to finish, the only monetary costs associated with www.mpltl.org have been for hosting, which comes to about $100.00 per year.

Our challenges thus far have been largely in areas of managing content and capabilities on the site. Most significantly, we have struggled to deliver on the promise of Universal Design for Instruction (UDI) for the portion of our site that delivers streaming video of MPLTL peer leaders demonstrating self-talk strategies for advanced problem solving. To deliver these videos online while allowing viewers maximum control over the display and accessibility of associated text and images, we had to draw on more specialized skills with Macromedia Flash than we had at the ready. After a few months of grappling with the problem, we availed ourselves of highly proficient and relatively low-cost student labor.

In addition, we have struggled to document the inner workings of our Joomla system for the benefit of non-technical users. As inexpensive as the modules are that have allowed us to customize our site's capabilities, they come with little in the way of documentation, and we have had to replace a number of modules with

better-functioning competitors. We expect this latter issue to be an ongoing one. With a site that is built on multiple, interacting modules, upgrades to one capability can create issues elsewhere. For instance, a chart display module required us to update the site's Joomla core, which then rendered our online document exchange module useless – but only after we had created our own documentation on how to use it. The community that produced the document exchange tool has yet to come up with a new version, and we find ourselves making do with a less desirable module in the meantime.

These issues are significant but thoroughly manageable, and on balance, the kind of open-source, low-cost system we have pursued is by far the best match in a crowded marketplace.

Conclusion

The MPLTL team has collected quantitative and qualitative data to document outcomes and insights during this project. Research results are presented on the project website under six broad research questions. Students with disabilities expressed overall high levels of satisfaction with the MPLTL experience and provided important insights about unintended barriers implicit in large lecture STEM courses and even the PLTL learning environment. Peer leaders enjoyed the enriched training and frequently commented that what they learned in MPLTL could be useful to *all* PLTL students. The project team is hopeful that a new 3-year grant application to the National Science Foundation will be funded. If so, the team will be able test this intriguing perspective by extending the MPLTL training to a wider group of PLTL peer leaders before analyzing the academic outcomes of students with disabilities and the instructional self-efficacy of peer leaders using a matched-group design. Campus partnerships would then constitute future steps in the team's research agenda to implement and evaluate UDI-infused training enhancements for PLTL leaders at other colleges and universities.

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References

Depape, A.R., Hakim-Larson, J., Voelker, S., Page, S., and Jackson, D.L. (2006). Self-talk and emotional intelligence in university students. *Canadian Journal of Behavioural Science*. Retrieved May 15, 2008 from http://findarticles.com/p/articles/mi_qa3717/is_200607/ai_n17180827/.

Harbour, W. (2004). *The 2004 AHEAD Survey of Higher Education Disability Service Providers*. Waltham, MA: Association on Higher Education and Disability.

Hockings, S.C., DeAngelis, K.J., and Frey, R.F. (2008). Peer-led team learning in general chemistry: Implementation and evaluation. *Journal of Chemical Education, 85*, 7 (July), 990-996.

Program stems exodus of students with LD in STEM majors (2009, February). *Disability Compliance in Higher Education*, 14(7), 1, 4-5.

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