Peer-Led Team Learning

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Outline

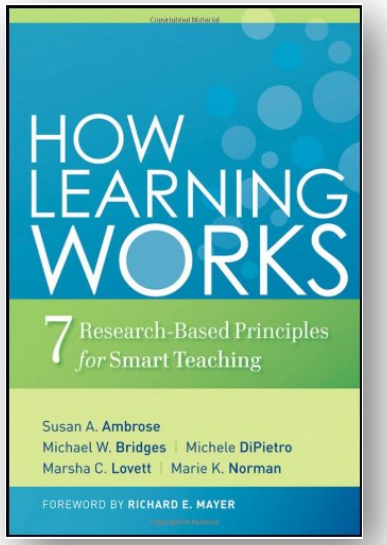
- What we know about learning
- PLTL overview, implementation
- Evaluation
- cPLTL development and results in Gen Chem
- Lessons learned
- Current project

What do we know about learning?

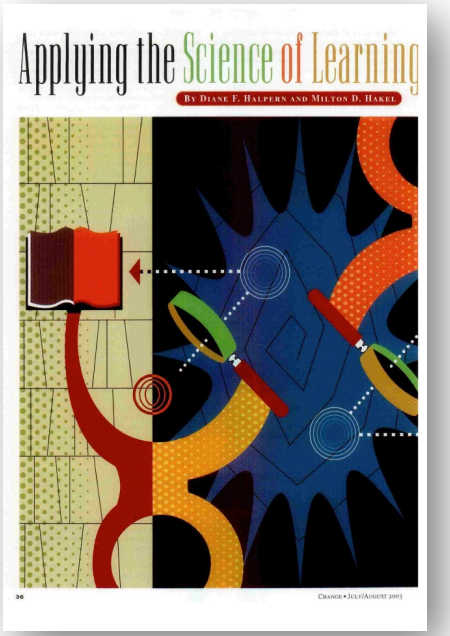
What is Learning?

- Takes place in the mind
- Involves change in knowledge
- Constructed by students
- Students need metacognitive skills
- “peer group---the most potent source of influence on growth and development during the undergraduate years” Astin 1993

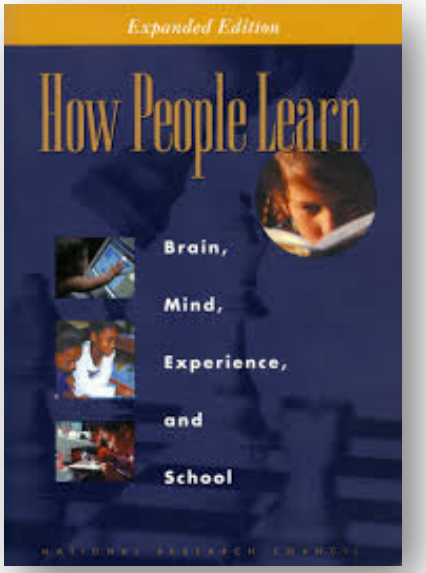
Some Literature About Learning



2010



2003



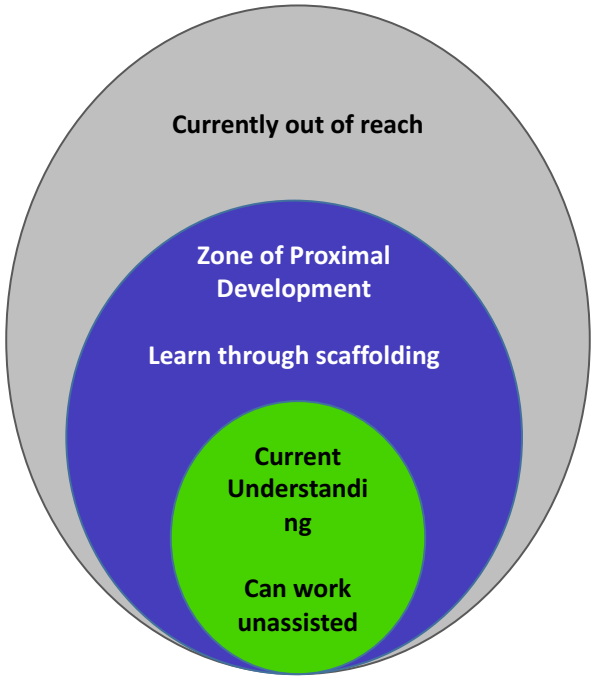
2000

Teaching is Not Learning

Zone of Proximal Development

- The difference between what a learner can do without help and what he or she can do with help. Soviet psychologist Lev Vygotsky (1896–1934).
- Learning occurs when tasks are just above the ZPD. If too easy the students don't try and if too difficult they give up.

Social Constructivism



Vygotsky, 1978; blogs.ubc.ca

Intellectual Development in College

- Student faculty interaction outside the classroom
- Involvement on campus through various forms of community-building activities
- Involvement with student peer groups
- “peer group---the most potent source of influence on growth and development during the undergraduate years”

Astin, A.W. (1993) **What Matters in College?** Jossey-Bass Publishers, San Francisco. pg. 394.

Overview of Peer-Led Team Learning

Peer-Led Team Learning (PLTL) Workshop

- Students work in groups to solve challenging problems by debating, negotiating, and building consensus under the guidance of a trained undergraduate peer leader. **Complement to the lecture**.
- Critical Components:
  - Faculty involvement
  - Integral to the course
  - Leader Selection Training
  - Appropriate materials
  - Appropriate organizational arrangements
  - Administrative support

Gosser, D.K., M.S. Cracolice, J.A. Kampmeier, V. Roth, V. Strozak, and P. Varma-Nelson 2001
The Workshop Model: Peer Leadership and Learning. A Guidebook. Prentice Hall, Upper Saddle River, NJ.

Course

- 3 hours of lecture per week
- 2 hours of PLTL workshop per week

Materials

- Identical General Chemistry workbook utilized in PLTL & cPLTL
- 15-unit workbook includes typical first semester General Chemistry content
- Three parts per workbook unit:
  - Self-test
  - Workshop problems
  - Post-workshop exercise


Peer-Led
Team Learning
A HANDBOOK FOR
TEAM LEADERS
Peer-Led
Team Learning
A GUIDEBOOK
DAVID K. GOSSER
MARK S. CRACOLICE
J.A. KAMPMEIER • VICKI ROTH
VICTOR S. STROZAK
PRATIBHA VARMA-NELSON
THE WORKSHOP PROJECT

Peer-Led Team Learning (PLTL)

Peer: A more experienced undergraduate student who has recently completed the course.

Led: Refers to leadership. A leader is an undergraduate student who acts as a guide to others. Goes through extensive training to assume this role.

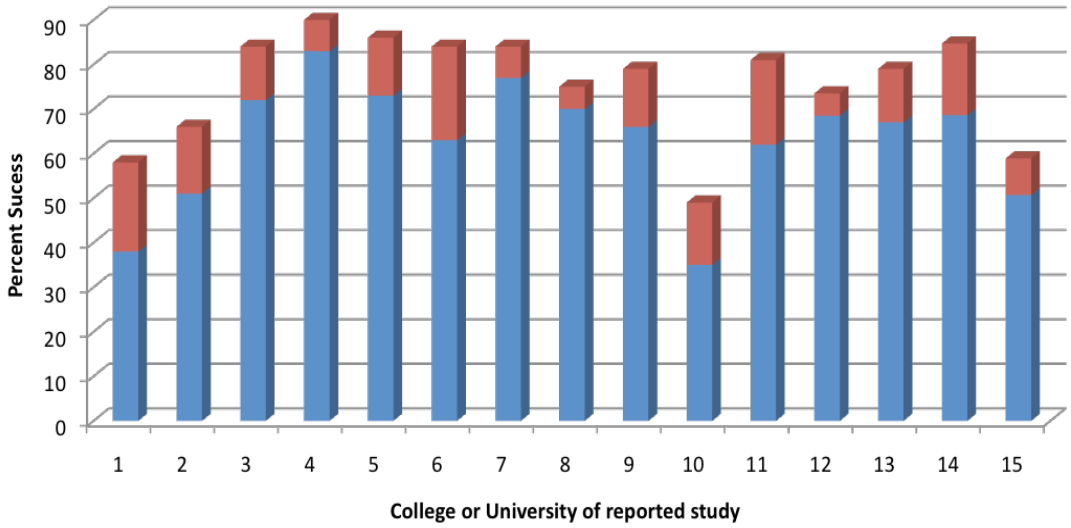
Team: A group of 6-8 students who work together to achieve a common goal.

Learning: The goal of the team is to learn chemistry.

Gosser, D.K., M.S. Cracolice, J.A. Kampmeier, V. Roth, V. Strozak, and P. Varma-Nelson 2001
The Workshop Model: Peer Leadership and Learning. A Guidebook. Prentice Hall, Upper Saddle River, NJ.

Questions?

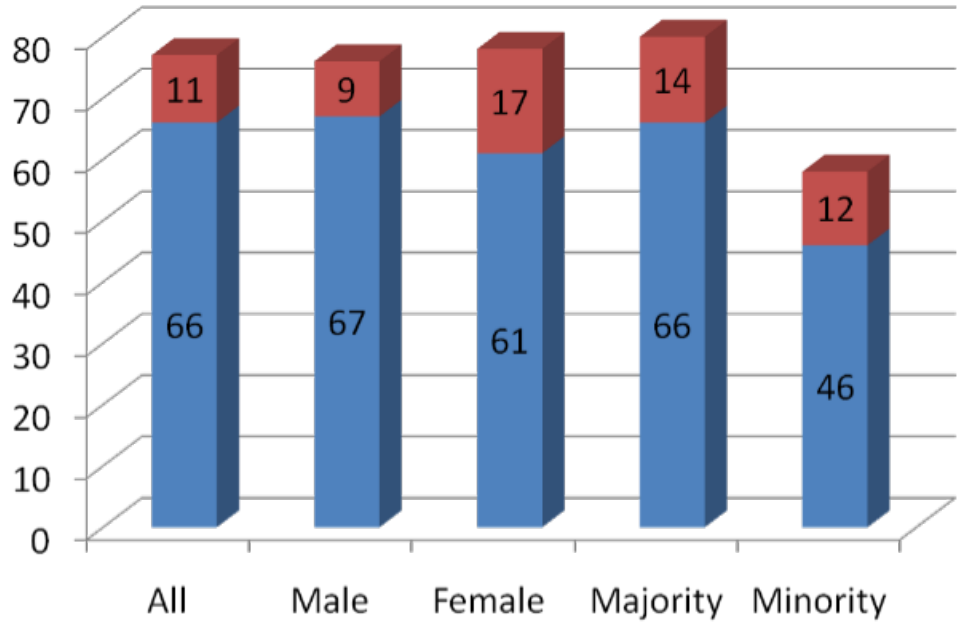
Evaluation and Reproducibility



City College of New York, (1-2), St. Xavier Chicago, (3), U. of Pittsburgh (4), Penn State Schuykill, (5), U. of Kentucky (6), U. of Ohio Athens (7), U. of Miami Ohio (8), U. of Rochester, Org (9), U. of West Georgia (10), and NYC Technical (11).

12-15 (Independent studies)

Blue = Non PLTL Red = PLTL



Tien, Roth, Kampmeier J. Res. Sci. Teaching (2002) U. Rochester Organic Chemistry

Blue = Non PLTL Red = PLTL

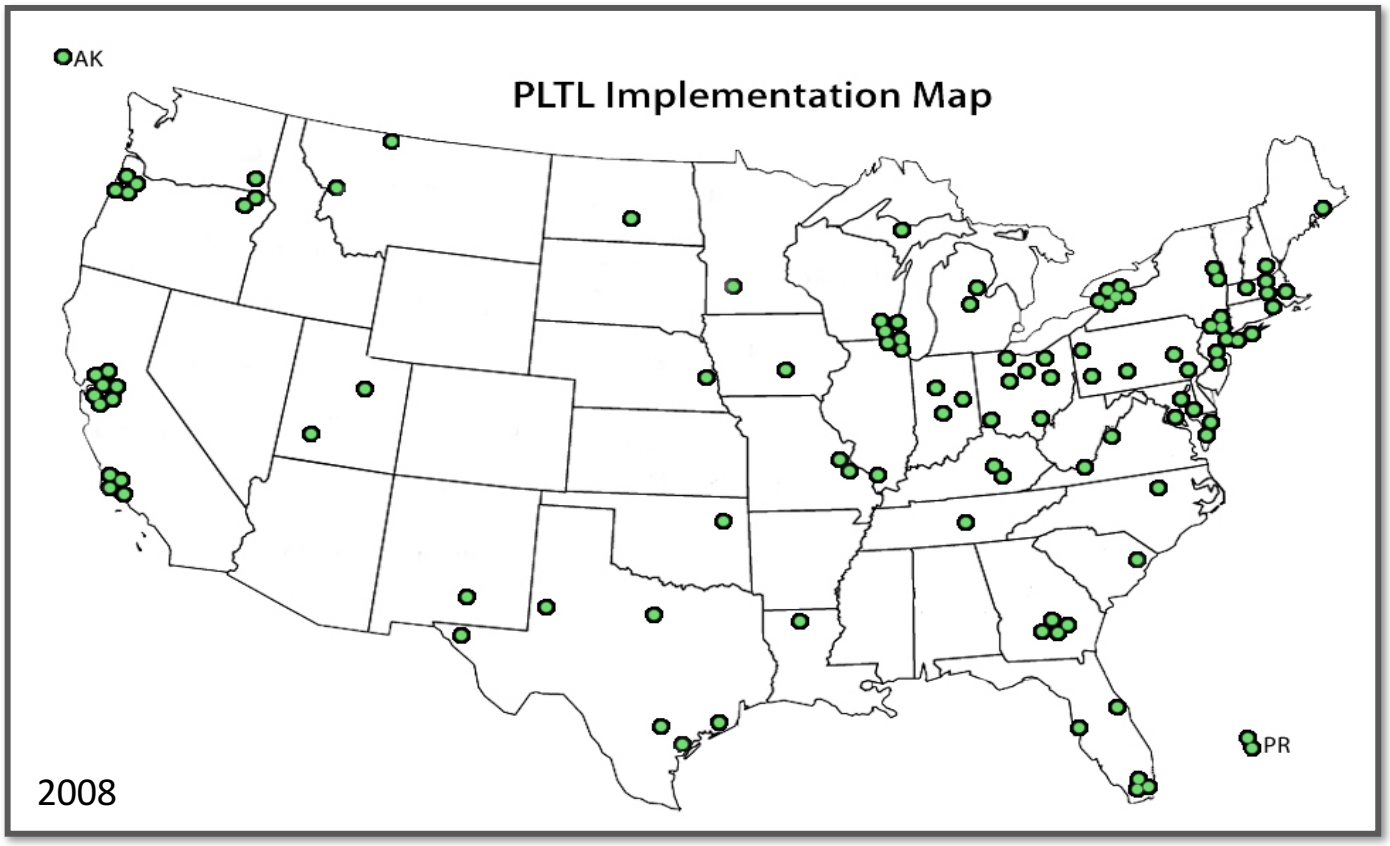
Former Peer Leader Quotes

"… I gained the knowledge and confidence I needed to pursue a career in pharmacy. During many medicinal chemistry courses in pharmacy school I became known as the group leader."

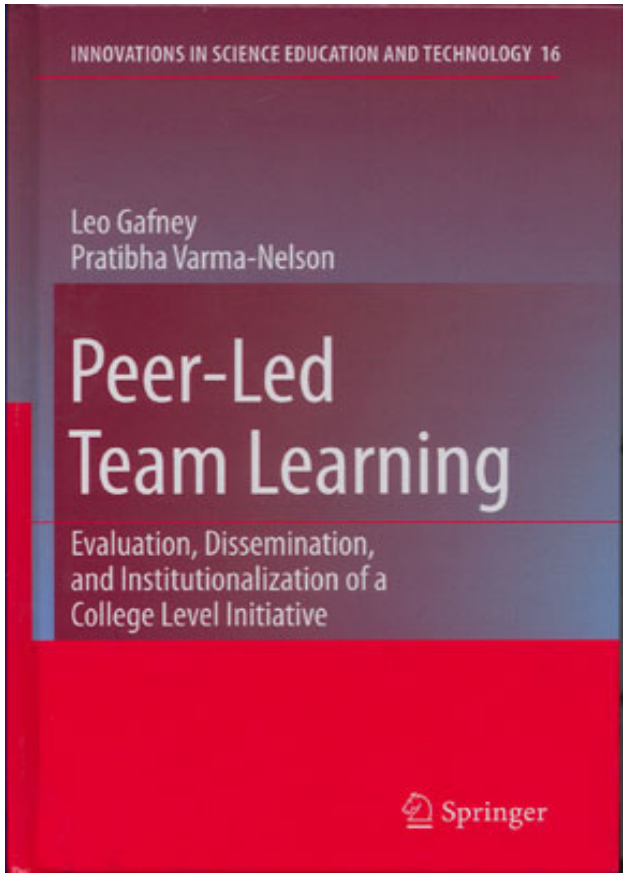
"… useful in my work, in acknowledging that sometimes when people don't understand a concept, it's simply because of the way it is being presented to them."

"It was the first time I realized how many gaps there are in my own understanding of chemistry."

Gafney, L. and Varma-Nelson, P. (2008) *Peer-Led Team Learning: Evaluation, Dissemination and Institutionalization of a College level Initiative*, Dordrecht, The Netherlands: Springer



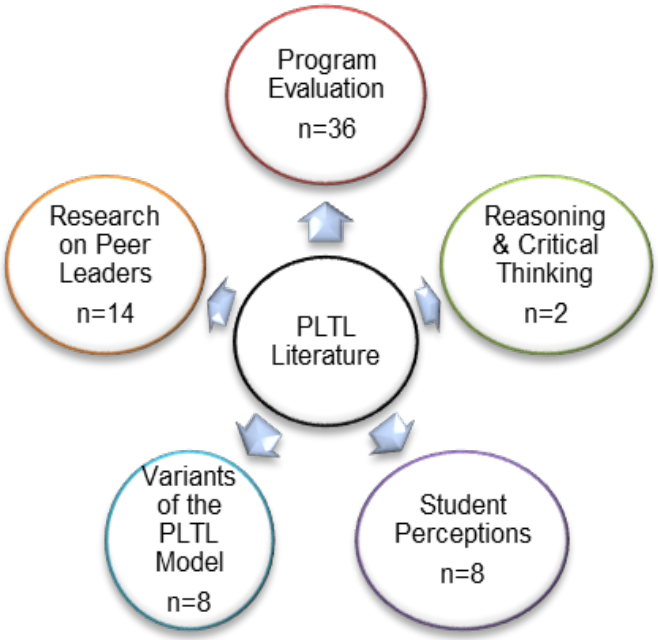
Gosser, D.K.,Kampmeier,J.A., & Varma-Nelson, P., (2010), Peer- Led Team Learning: 2008 James Flack Norris Award Address, Journal of Chemical Education, 87(4), 374-380.


INNOVATIONS IN SCIENCE EDUCATION AND TECHNOLOGY 16
Leo Gafney
Pratibha Varma-Nelson
Peer-Led
Team Learning
Evaluation, Dissemination,
and Institutionalization of a
College Level Initiative
Springer

Disciplines

- General Chemistry
- Organic Chemistry
- Biochemistry
- Biology
- English
- Engineering
- Psychology
- Physics
- Mathematics
- Computer Science
- Nursing

Literature Review of 62 Peer-Reviewed STEM Studies



Research approach	# of studies
Mixed methods	16
Quantitative	36
Qualitative	10

Wilson and Varma-Nelson, JCE, 2016

Program Evaluations

Reference	Mean Course Grade	Pass Rate (% ABC)	DFW Rate	First-semester ACS Exam Scores	Semester Exam Grades	Retention
Akinyele (2010)			✓			
Alger & Bahi (2004)				✓		
Alo et al (2007)		✓				
Biggers et al (2009)		✓				
Chan & Bauer (2015)				✓	✓	
Curran et al (2013)					✓	
Drane (2005)	✓					✓
Finn & Campisi (2015)					✓	
Flores et al (2010)		✓				
Foroudastan (2009)						✓
Hockings, DeAngelis, & Frey (2008)	✓					✓
Hooker (2011)		✓		✓		✓
Horwitz & Rodger (2009)	✓	✓				
Lewis (2011)		✓		✓		✓
Lewis (2014)						✓
Loui et al (2013)					✓	✓
Lyle & Robinson (2003)	✓				✓	
Lyon & Lagowski (2008)	✓				✓	
Mauser et al. (2011)	✓		✓	✓		
Merkel & Brania (2015)		✓				✓
Mitchell, Ippolito & Lewis (2012)	✓	✓		✓		
Mottley & Roth (2013)	✓					
Pazos et al (2007)						✓
Peteroy-Kelly (2007)	✓				✓	
Preszler (2009)		✓	✓			
Rein & Brookes (2015)	✓					
Reisel et al (2012)	✓					
Reisel et al (2013)	✓					
Reisel et al (2014)	✓					
Roach & Villa (2008)						✓
Shields et al (2012)	✓					
Smith et al. (2014)	✓		✓	✓		
Tenney & Houck (2003)	✓	✓				
Tien, Roth, & Kampmeier (2002)	✓	✓				
Wamser (2006)		✓		✓		
White, Rowland, & Pesis-Katz (2012)	✓					

Findings from PLTL Literature

- Correlation between attendance and course grades

  (Tenney & Houck, 2003; Mottley & Roth, 2013)
- PLTL students' course grades were statistically higher than non-PLTL students' course grades in 78% of the 36 program evaluation studies
- Significant difference in Calculus I PLTL students' course grades, but only an improvement for Algebra PLTL students

  (Reisel et al, 2012, 2013, 2014)
- Significant improvement on tissues/muscle physiology unit and a partial effect in other anatomy & physiology topics

  (Finn & Campisi, 2015)

cPLTL Development at IUPUI

http://cpltl.iupui.edu/

Interdisciplinary cPLTL Research Group

- Joshua Smith, Dean, School of Education, Loyola U. Baltimore
- Sarah Wilson, postdoc
- Juliana Banks, former postdoc
- Lin Zhu, Lecturer, Chem
- Lorie Shuck,IT, IUSM
- Tom Janke, IT, CTL
- Randy Newbrough, IT, UITS

Undergraduate Students

- Jordan Cagle, Bio
- Eunice Jeong, Chem
- John Sours, Chem
- Kevin Mauser, BME
- Stephanie Metcalf, Chem
- Jacob McDaniel, Philosophy
- Tyler Vernon
- Ibrahim Khan
- Elyse Feder
- Gabriela Mazur

Acknowledgments

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- PLTL Project Partners
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- NSF-DUE-0941978
- NGLC Wave I
- NGLC Wave I (Follow-On)

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Chihuli in the Medical Sciences Bldg

Thank you for listening!

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For more information visit

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