

# Peer-Led Team Learning in a Research-Based Laboratory Course

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March 28 2007, 233rd ACS Meeting, Chicago

*Center for Authentic Science Practice in Education*  
*[www.caspie.org](http://www.caspie.org)*



# The CASPiE Model

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- Provide access to research experiences for freshmen and sophomores as part of the mainstream curriculum (**modules**)
- Give students the opportunity to use advanced instrumentation through a network for remote access (**remote access**)
- Create a collaborative learning environment with the opportunity to contribute to new knowledge and be part of a scientific community (**PLTL**)

# PLTL: Peer-Led Team Learning

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*Peer* A more experienced undergraduate student who has recently completed the course with a good grade.

*Led* Refers to leadership. A leader is a guide to others. Goes through extensive training to assume this role.

*Team* A group of 6-8 people who work together to achieve a common goal. A distinguishing characteristic of a *team* is that *it has a leader*.

*Learning* The goal of the team is to learn chemistry. Our focus is on student learning.

# PLTL in a lecture course

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- Groups of 6-8 students meet weekly (2 hours) to work on problems as a team
- Supplement to the lecture
- A well trained peer facilitates each team
- No answer key
- Implemented successfully across science and math fields
- Brings research model of teaching to the classroom

Gosser, D.K., M.S. Caroline, 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.

# The scientific research group

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- Excellent model for an effective team.
- A collection of roles and a process remains in place, while novices and other new members flow in as trained experts depart.

# Why team learning works

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Combines 4 well-established areas of educational design and research

- Group Learning
- Reciprocal Teaching
- Vygotsky Model
- Studio Instruction

Varma-Nelson, P. & Coppola, B.P. (2004). Team Learning. In Pienta, N., Cooper, M.M., and Greenbowe, T. (Eds), *The Chemists' Guide to Effective Teaching*. Upper Saddle River, NJ: Prentice Hall.

# CASPiE PLTL Model

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- Peer leaders have module experience
- Each peer leader facilitates two teams of three in workshops



- Peer leaders NOT involved in curriculum development or grading
- PLTL groups help create a research group environment

# Peer leaders

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- Trained in leadership and learning theory
- Good communication skills
- Performed well in course
- Enthusiastic and motivated to help classmates
- Catalysts in forming a community

# Peer leader responsibilities

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- Attend training session with faculty each week (1hour)
- Write a journal reflecting on the lab/workshop (15 minutes)
- Prepare for the lab (modules and techniques) (15 minutes)
- Facilitate 2 groups of three in the lab (3 hours)
- Conduct workshop outside of lab (optional)

# Peer Leader Roles

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## In Lab

- Emphasize “big picture” of the research
- Guide teams
- Not an authority figure / TA

## Outside of Lab

- Emphasize “big picture” of the research
- Lead discussions and workshop activities

# PLTL Sessions: Lab Discussion

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Weekly 10-15 minute discussion of the lab helps students to...

- understand the “big picture” of the research
- analyze their data and develop plans for future experiments
- evaluate possible hypotheses for research projects

# PLTL Sessions: Workshop Activities

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- one central idea per workshop
- interactive
- should require thought, explanations
- students develop their own answers and build confidence in those answers

# Workshop Topics

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- Keeping a Lab Notebook
- Experimental Design
- Evaluation and Interpretation of Data
- Research in Chemistry
- Poster Preparation
- Ethical Conduct in Science
- Writing an Abstract
- Reading a Research Paper
- Peer Review (introduction)
- Peer Review (practice)
- Writing a Scientific Paper

in development: Scientific Literature, Oral Presentations

# Course Implementation

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## *Fall 2005 pilot*

- Purdue: 6 students, 2 peer leaders, outside of lab

<i>Spring 2006</i>	# students	# peer leaders	Workshop materials?
Northeastern Illinois University	30	6, in lab	no
Ball State University	24	4, in lab	no
University of Illinois at Chicago	9	2, in lab	yes
College of DuPage	37	6, in and out of lab	yes
Purdue University	21	4, out of lab	yes

# Spring 2006 Evaluation

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- Student and peer leader interviews
- Student and peer leader surveys
- Peer leader focus group at Purdue

# Peer Leaders In Lab Model

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“Basically we played the role as a lab instructor” - in-lab peer leader

“[The TA’s job] was kind of the same principle as the peer leaders, almost” - student

“So, I guess that would be the main point of the peer leaders, to kind of guide you instead of providing you with any information” - student

“She didn’t really give anybody any answers but she was very good at guiding.” - student

“We started having meetings after class like at night.” - in-lab peer leader

# Peer Leaders Outside of Lab Model

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- Lack of peer leader knowledge of lab

“If we had questions, she really couldn’t answer ‘em.” - student

“...the PLTL leaders didn’t know enough to always answer our questions. Because a lot of times we’d just be relayed to another person to ask them.” - student

“We as the peer leaders we were kind of lost [...] we were having trouble answering them sometimes.” - outside-of-lab peer leader

# Peer Leaders Outside of Lab Model

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- **Benefits**

“It was a good place to go have the day before lab where you can just kind of catch up with your group if you need to.”

- student

“...it was very, kind of a round robin sort of conversational interaction.” - student

“I thought it would have been nicer to have it outside of lab time so that they're not thinking about whatever reaction they're running, not looking over at their hoods.” - in-lab peer leader

# Workshop Materials

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- Students prefer workshops that are directly related to their lab requirements

“With the posters, it was nice to see other posters, what they, how people made them, ‘cause I’ve never, I’ve never made a poster for a more professional type class before, you know.” - student

“I think the workshops that helped us prepare for the projects were helpful. But I don’t think like the learning how to read a research paper one was extremely helpful, at all.” - student

# Issues to consider in your own program

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- Do you need a workshop outside the lab?
- Can you schedule a workshop outside the lab?
- Do the peer leaders have enough experience with module(s)?
- Are the leaders adequately trained?
- Is the instructor-peer leader communication adequate?
- Are you able to address the issues that arise in the leader journals?
- Do you read the journals regularly?
- Do you have a research group environment in the labs?

# Acknowledgements

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- Cianán Russell
- Zac Rouse
- Bill Boone and Laura Koehl
- CASPiE peer leaders and students
- NSF CHE-0418902 (CASPiE Undergraduate Research Center)
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National Science Foundation  
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