Using Peer-Led Team Learning in Introductory Computer Science

Susan Horwitz
University of Wisconsin-Madison

Susan Rodger
Duke University

And many others…
8 NSF-FUNDED SCHOOLS

University of Wisconsin – Madison
Susan Horwitz
8 NSF-FUNDED SCHOOLS

Beloit College
Steve Huss-Lederman
8 NSF-FUNDED SCHOOLS

Duke University
Susan Rodger
8 NSF-FUNDED SCHOOLS

Georgia Tech
Maureen Biggers, Monica Sweat
8 NSF-FUNDED SCHOOLS

Loyola College in Maryland

David Binkley
8 NSF-FUNDED SCHOOLS

Purdue University
Susanne Hambrusch
8 NSF-FUNDED SCHOOLS

Rutgers University
Barbara Ryder
8 NSF-FUNDED SCHOOLS

University of Wisconsin – Milwaukee

Ethan Munson
WHAT IS PLTL?

• 2-hour per week add-on to CS 1

• Active recruiting (invite women/minority students to join)

• Active, cooperative learning in small groups

• Groups led by undergraduate “peer”
EXAMPLE EXERCISE

moveToFront( int pos )
Move the letter in position pos to the beginning of the word (i.e., to position zero)

moveToEnd( int pos )
Move the letter in position pos to the end of the word.

swap( int pos1, int pos2 )
Swap the letter in position pos1 with the letter in position pos2.

reverse( int start, int finish )
Reverse the order of the letters in positions start to finish.
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<th>word after the code executes?</th>
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EXAMPLE EXERCISE

• Start with the string “DEBIT-CARD”

• Execute the following code:

```python
word.moveToFront(7)
word.moveToEnd(5)
word.swap(2,5)
word.reverse(3,6)
word.swap(7,4)
word.moveToEnd(5)
word.swap(8,9)
word.moveToFront(5)
```
EXAMPLE EXERCISE

• Start with the string “DEBIT-CARD”
• Execute the following code:

```java
word.moveToFront(7) ADEBIT-CRD
word.moveToEnd(5) ADEBI-CRDT
word.swap(2,5) AD-BIECRDT
word.reverse(3,6) AD-CEIBRDT
word.swap(7,4) AD-CRIBEDT
word.moveToEnd(5) AD-CRBEDTI
word.swap(8,9) AD-CRBEDIT
word.moveToFront(5) BAD-CREDIT
```
WHY DO PLTL?

Improve retention rates: 93.2% vs 88.0%

All schools combined: 2005 - 2007
WHY DO PLTL?

 Improve grades: 80.2% vs 68.4% got B or better

All schools combined: 2005 - 2007
WHY DO PLTL?

Improve grades: 83.3% vs 70.1% got B or better

EVEN BETTER FOR WOMEN!

All schools combined: 2005 - 2007
WHY DO PLTL?

• Great for students

• Great for Peer Leaders
  – rewards of “giving back”
  – improved leadership skills
  – cements own knowledge of material

• A lot of fun!
WANT TO TRY PLTL?

• Most important resource = YOU

• Institutional support
  – Initially very time consuming
  – Need to coordinate with CS 1 instructor

• $$ helpful (pay Peer Leaders, field trips, dinners…)
  – institution (Chair, Dean)
  – donations from companies
WHAT WILL YOU DO?

• Hire Team Leaders
• Recruit Students
• Train Team Leaders
  – ½ day before start of semester
  – weekly meetings
• Write weekly exercises (many available)
• Organize extra activities
RESOURCES: PRENTICE-HALL
WE CAN HELP, TOO!

www.pltlcs.org

Peer Led Team Learning in Computer Science

Welcome

Peer-Led Team Learning (PLTL) involves students working cooperatively in small groups, led by trained undergraduate "peer leaders". PLTL has been used successfully for many years in Chemistry and other science courses to improve retention, boost grades, and increase students' enthusiasm for the subject. With funding from NSF, eight universities (listed below with links to their program sites) have been applying PLTL in Computer Science for the past three years.

PLTL in CS Workshop at Duke - April 28-29, 2007

News

Barbara Ryder mentioning our project in New York Times Article April 17, 2007

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course descriptions sample exercises
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how to recruit/train Peer Leaders
WE CAN HELP, TOO!

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details on each school's program
WE CAN HELP, TOO!

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Search Exercises

**Title:**

**Language:**
(check at least one)
- Alice
- C++
- Java
- Other
- Any Language (over-rides other selections)

**Topic:**
(check at least one)
- Algorithms
- Code Simulation
- Concept
- Games
- Learning Techniques
- Logic
- Programming
- Team Building
- Any Topic (over-rides other selections)

**Key Words (comma delimited list):**

[Search]
## Search Exercises

You searched for:
- **Title:**
- **Language:** java,
- **Topic:** programming,
- **Keywords:** maze

Results Returned: 1

<table>
<thead>
<tr>
<th>Title</th>
<th>Topic</th>
<th>Language</th>
<th>Creator</th>
<th>Answer for registered user</th>
</tr>
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<tr>
<td>Java Programming to Solve a Maze</td>
<td>programming</td>
<td>java</td>
<td><a href="mailto:rodger@cs.duke.edu">rodger@cs.duke.edu</a></td>
<td>Not available</td>
</tr>
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**Description**
Gain programming experience with Java through solving a maze problem.

**Materials Needed**
- computers

**Keywords**
- maze
PLTL SUMMARY

• PLTL improves retention and grades
• PLTL help Peer Leaders
• PLTL is fun!
• Many resources available: try it soon
"I have several lectures that same day, and I originally thought, *Oh my God, by the time this comes around I'm going to be like, get me out of here.* But it's actually really enjoyable. It has to be the fastest two hours of my day."

“I thought the group would be full of CS geniuses, but actually it was a fun group.”

I wish my discussions were like this for every class!”