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

Loyola College in Maryland
David Binkley

Purdue University
Susanne Hambrusch

Rutgers University
Barbara Ryder
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

<table>
<thead>
<tr>
<th>Original word</th>
<th>Java code</th>
<th>word after the code executes?</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIPSH</td>
<td>word.moveToFront(2)</td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY</td>
<td>word.moveToEnd(0)</td>
<td></td>
</tr>
<tr>
<td>PICKLES</td>
<td>word.swap(0,6)</td>
<td></td>
</tr>
<tr>
<td>AVOCADO</td>
<td>word.reverse(4,6)</td>
<td></td>
</tr>
</tbody>
</table>
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.

Original word | Java code | word after the code executes?
--- | --- | ---
HIPSH | word.moveToFront(2) | PHISH
ZOOLOGY | word.moveToEnd(0) | OOFLOGY
PICKLES | word.swap(0,6) | SICKLEP
AVOCADO | word.reverse(4,6) | AVOCODA

EXAMPLE EXERCISE

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

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**

- **Great for students**
- **Great for Peer Leaders**
  - rewards of “giving back”
  - improved leadership skills
  - cements own knowledge of material
- **A lot of fun!**

All schools combined: 2005 - 2007

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

All schools combined: 2005 - 2007
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

½ day before start of semester – weekly meetings

WE CAN HELP, TOO!
www.pltlcs.org

course descriptions
sample exercises
WE CAN HELP, TOO!
www.pltlcs.org

Peer Led Team Learning in Computer Science

Welcome

Find out how to recruit/train Peer Leaders and get details on each school's program.

Search Exercises

Title:

Language:
- Alice
- C++
- Java
- Other
- Any Language (over-rides other selections)

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

Key Words (comma delimited list):
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>
</thead>
<tbody>
<tr>
<td>Java Programming to</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>
<tr>
<td>Solve a Maze</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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!"