

Ideals and Practice in Peer Led Team Learning

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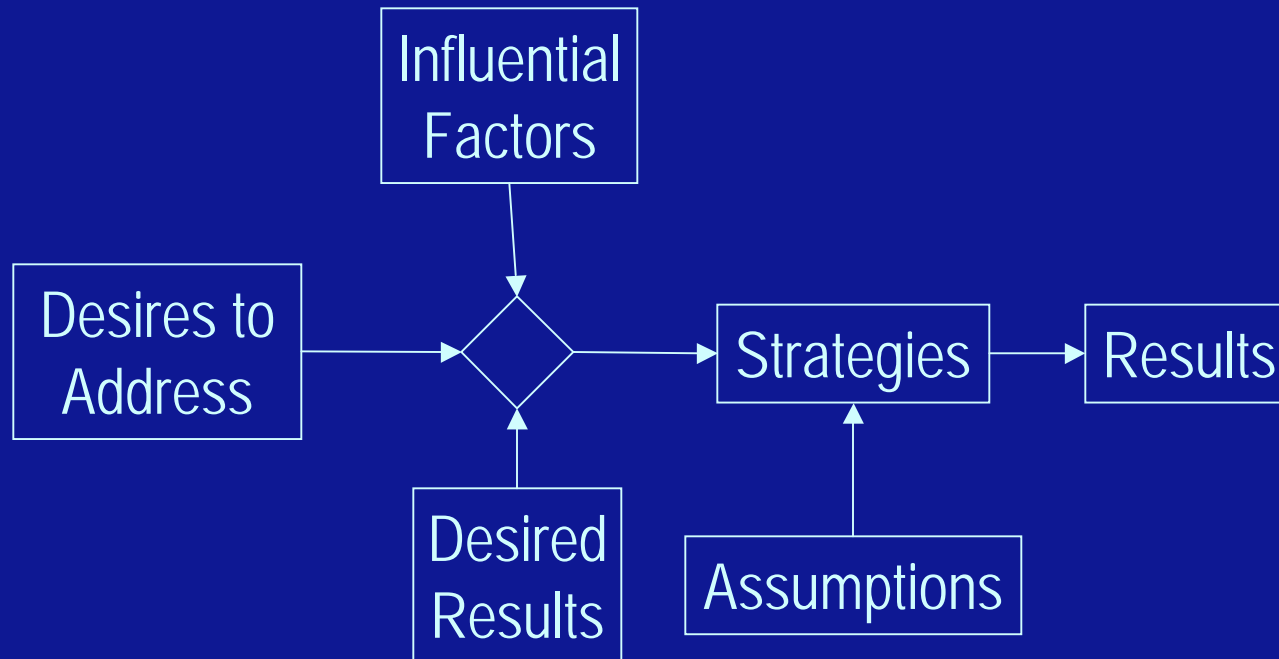
Consortium

- NSF-funded project to try Peer Led Team Learning (PLTL) in Computer Science (CS) from Fall '05 to Spring '08
 - Beloit College
 - Small, residential, liberal arts college
 - Duke University
 - Georgia Tech
 - Loyola of Baltimore
 - Purdue University
 - Rutgers University
 - University of Wisconsin-Madison
 - University of Wisconsin-Milwaukee

What Is Peer Led Team Learning?

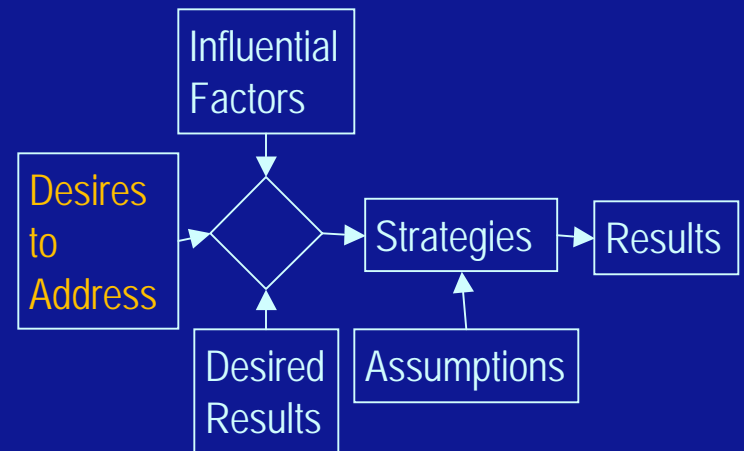
- PLTL involves
 - Students working in small groups
 - Trained undergraduate student facilitators
- It's about active learning so let's jump right in
 - Harold and the Purple Crayon

Roadmap



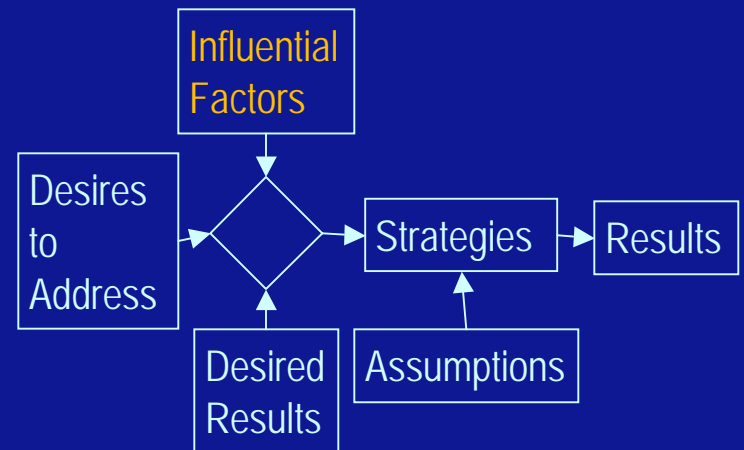
Desires To Address

- Lack of underrepresented students in CS
- Decreasing number of CS majors
- Diversity in the workforce



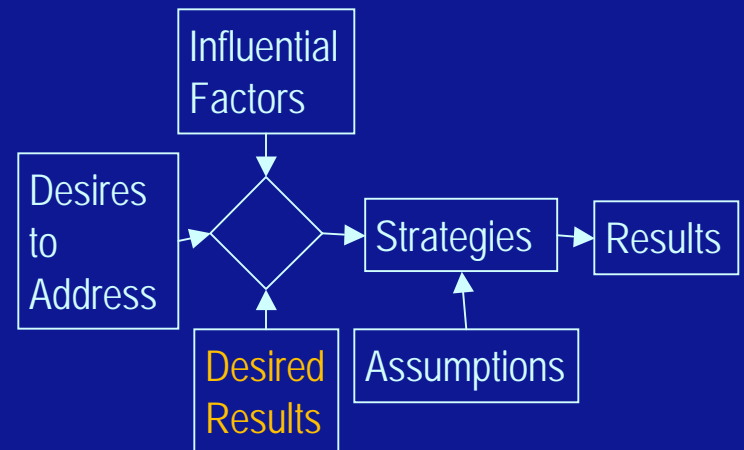
Influential Factors

- Faculty coordination
 - Ability to have a faculty member devote time & energy to the program
- Administrative support
 - Dean of Academic Affairs
 - Math & Computer Science Department
 - Learning Support Services Center (LSSC)
- Peer leaders
- Grant funding



Desired Results

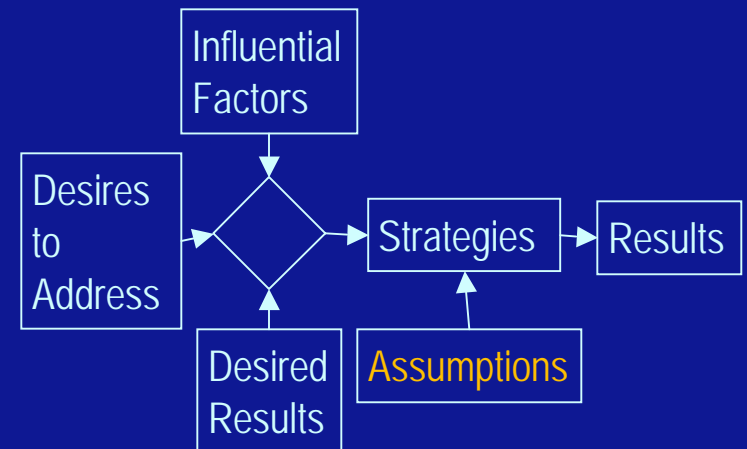
- More underrepresented students
 - Taking initial courses in CS
 - Continuing course work in CS
- Creation of CS pedagogy/curriculum open to
 - Different learning styles
 - Diverse backgrounds
- Increase skills in
 - Teamwork & Collaborative Learning
 - Communication
 - Knowledge of CS
- Create enthusiasm for taking CS



Assumptions

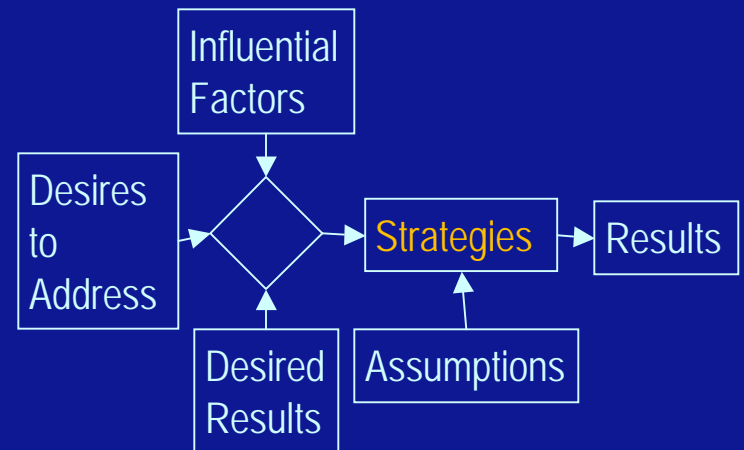
For underrepresented students:

- New pedagogical approach will enable greater student success
- Positive environment & experience will encourage more students to continue in CS
- Marketing the program as academically high achieving is likely to increase student's participation
- Active recruitment will increase participation



Strategies

- Pedagogical Changes
 - Introductory Course
 - Curriculum
- Active recruitment of students
- Introduction of PLTL into introductory course
- Community Building
 - Increased intervention with students
 - Social Support
 - Environmental Design



First Year of Program

- Recruitment
 - Top 25% of incoming women & minorities in math (7 of 26)
- Course expectations
 - Voluntary participation
 - 2 hours/week
 - No class credit
- Outcome
 - Student evaluation indicated that PLTL was valuable and enjoyable
 - PLTL students did not continue in CS

Second Year of Program

- Selection of participants
 - Random placement with $\frac{1}{2}$ in PLTL and $\frac{1}{2}$ with professor doing same type of activities
- Course expectations
 - Required
 - 2 hours/week
 - Significant class credit
- Outcomes
 - Mixed student evaluation of PLTL enjoyment and value
 - Higher continuation rates for all in CS

Collaboration With LSSC

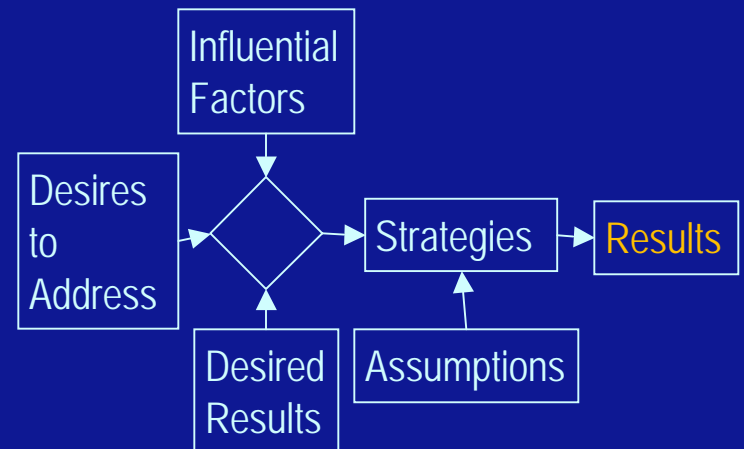
- Learning Support Services Center
 - Peer tutoring program
 - Academic enrichment activities
 - Disability services
- Why partner
 - Enhance training
 - Building resources
 - Faculty connection
- Collaborative activities
 - Training
 - PR/Recruitment (with TRIO)

Peer-Leader Training

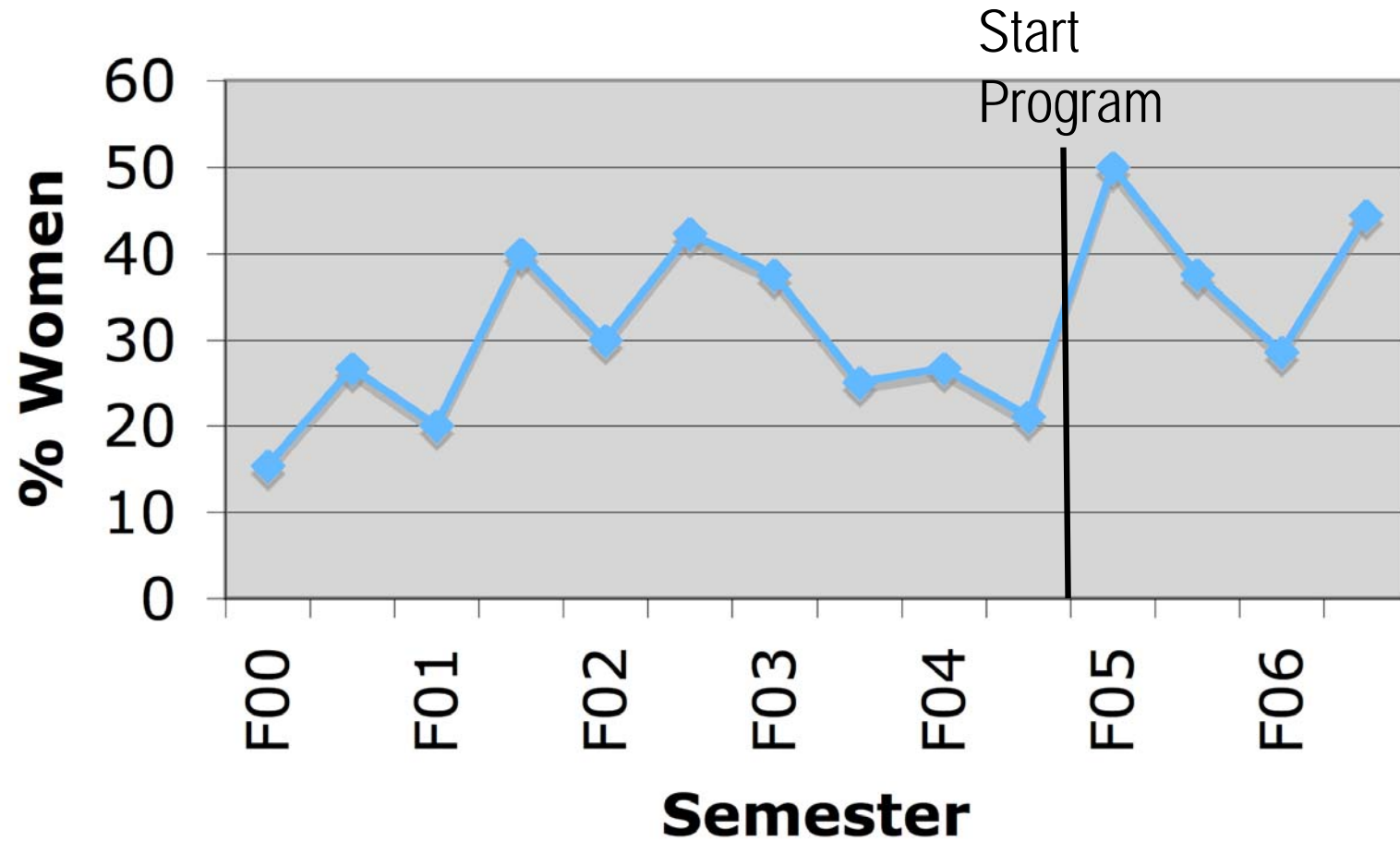
- Goals for the program
- Roles/Expectations of peer leaders
- Peer leader goals and concerns
- Running peer-led sessions, esp. the first one
- Facilitating discussions
- Trust building between peer leaders and students
- Group dynamics
- Learning styles

Tentative Results

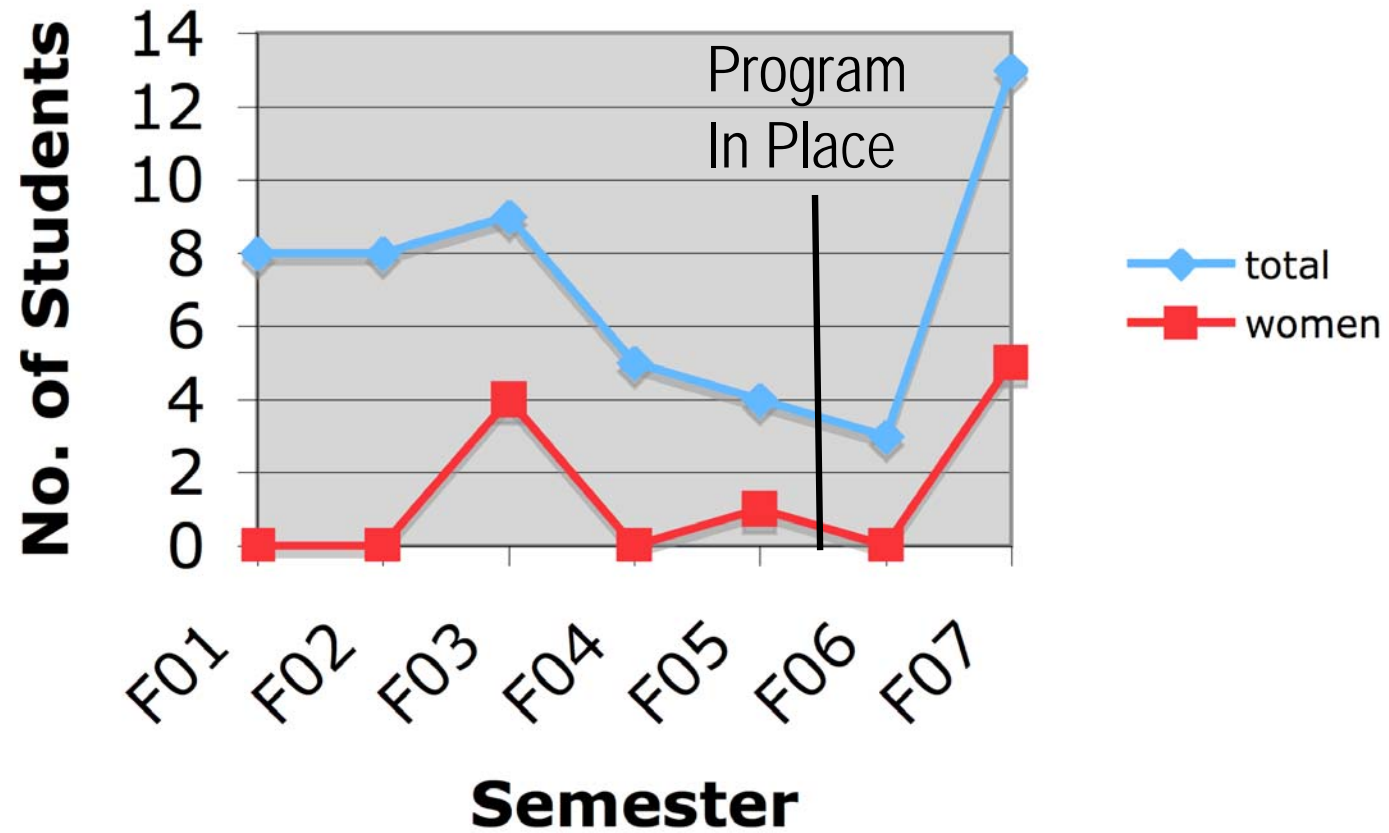
- Results are from a limited time and small numbers of students
- We have seen
 - Increases in women in intro course
 - Increases in overall enrollment in intro course
 - Increase in all students continuing in CS



% of Women in Intro CS Course



2nd Year Algorithms Enrollments



Resources

- Web site at <http://pltlcs.org>
 - It is under development and we welcome suggestions and feedback
 - Note: <http://pltl.org> is a valuable site but is by another group
- PLTL books
 - PLTL: A Guidebook & PLTL: A Handbook For Team Leaders from The Workshop Project
- Upcoming papers
- Us
 - Diane: arnzen@beloit.edu
 - Steve: huss@beloit.edu
 - Vicki: dominick@beloit.edu

Conclusions

- Entire class PLTL in Fall '08 due to
 - Increased student satisfaction
 - Positively impacted
 - Representation of women
 - Retention of women and all
- Desiring further data to draw definitive conclusions
- Disseminating results
 - To faculty at Beloit College
 - To educators

Thoughts or Questions



Harold Learns to Draw or How to View Methods, Abstraction & Encapsulation

An important skill in computer science is to learn how and when to split up parts of your program into separate units. You may recall from class:

- *Methods* are used to separate your program into parts
- *Abstraction* is the idea that you can use something without knowing its details. For example, you can use a method in a program by knowing what it does without knowing all the details of how it works.
- *Encapsulation* is taking a task and placing it inside a method. This allows for a single technique to reside in a clearly defined part of your program.

In this exercise you will draw pictures. There are many programs and methods available to do this. Today you will do it conceptually rather than using a programming language.

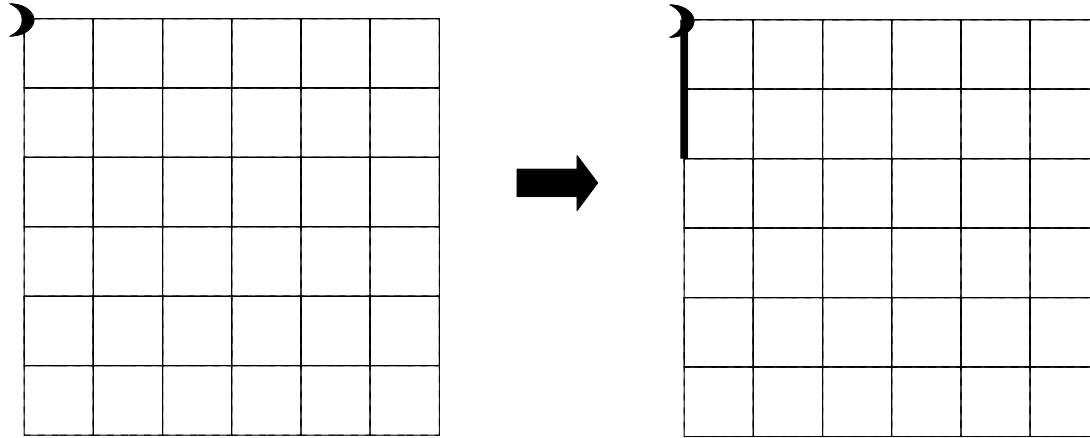
The Rules of the Game

There is a child named Harold – just like in Crocket Johnson’s “Harold and the Purple Crayon”. He has a purple crayon and can walk around. Here is what you can tell Harold to do:

1. Walk up, down, left or right.
2. How far to walk.
3. Hold the crayon up in the air (so he does not draw) or drag it on the ground (so he does draw)

A Quick Example

Harold always starts at the moon shape. If you told Harold to walk down for two blocks dragging the crayon he would create



We can also write this as

Direction	Blocks	Crayon Position
down	2	drag/↓

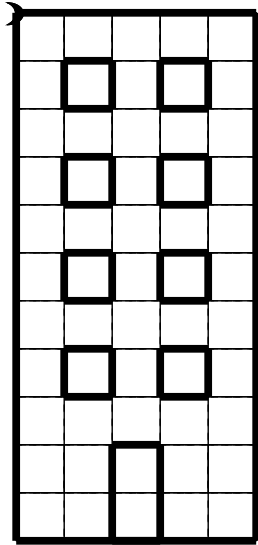
You Try One

In small groups figure out what Harold is drawing if he is given these instructions:

Direction	Blocks	Crayon Position
right	1	in air/↑
down	2	in air/↑
right	3	drag/↓
down	2	drag/↓
left	2	drag/↓
up	1	drag/↓
right	1	drag/↓



Creating Instructions for a More Complex Picture



List your directions for Harold:

Direction	Blocks	Crayon Position	Direction	Blocks	Crayon Position

Some ideas for the peer leader

- Consider having students take turns reading the directions
- Have groups compare their answers for each part
- In the second or third exercise, did they come up with the idea of grouping instructions to simplify the task?
- Have them discuss the different ways they did or could group instructions. Guide them if they don't see
 - square
 - groups of squares. Consider the trade offs of
 - one row of two squares and then do four rows
 - one column of four squares and then do two columns
 - creating a rectangle group
 - can do door and outside with this
 - using rectangle to create squares
 - this is a form of *inheritance*: one object/method getting its base capabilities from another one
 - shifting to a new location by right & down amount vs combining this with square routine