

Accelerated WARM UPS

Jonathan Cornick, G. Michael Guy, Robert J. Holt, Andrew S. H. Russell

Department of Mathematics and Computer Science
Queensborough Community College, CUNY

February 18, 2011

Work Partially Funded by an Improving Math Learning Grant from
The City University of New York

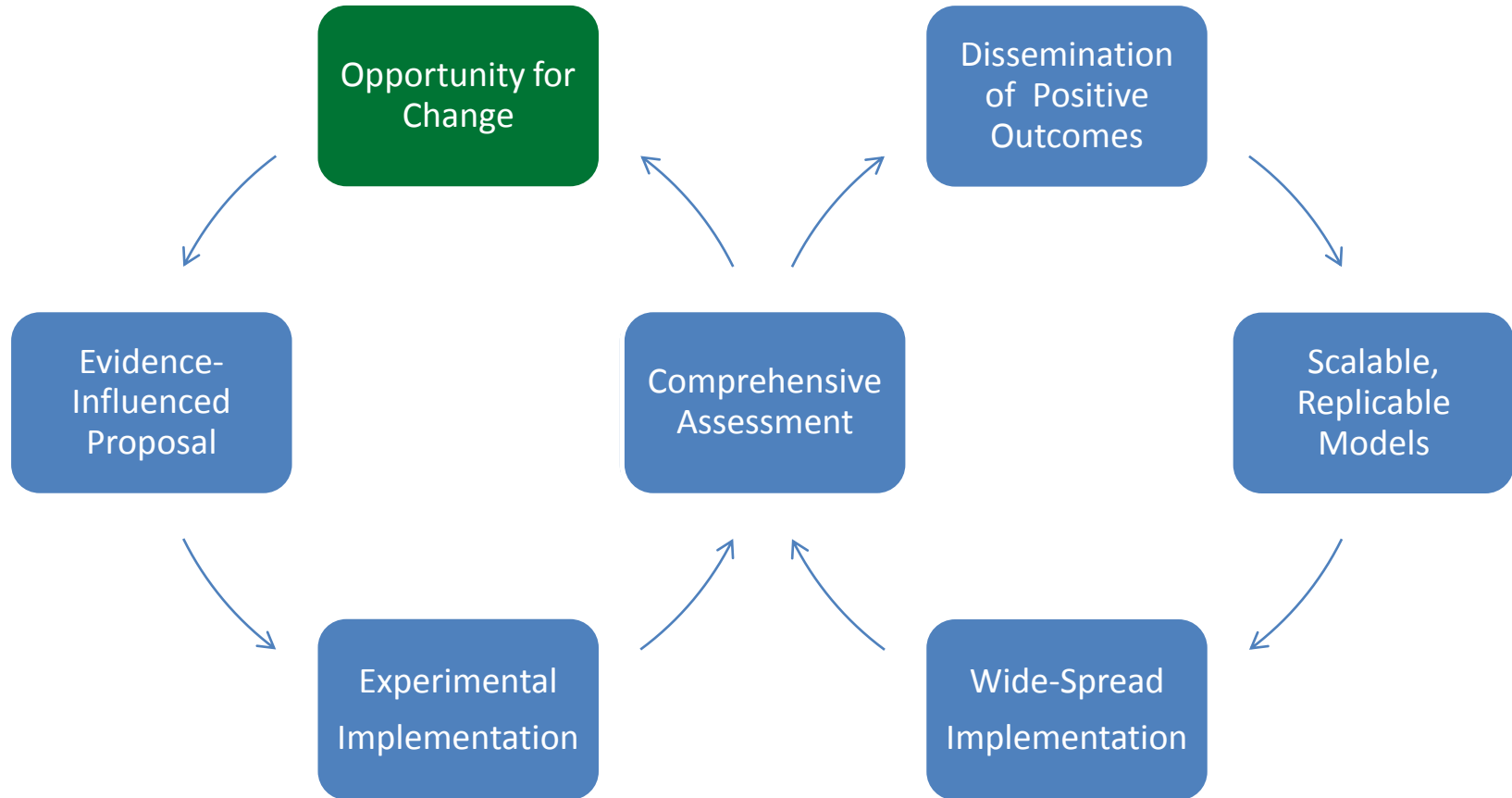
**Improving Math Learning Luncheon. The City University of New York.
Jonathan Cornick, G. Michael Guy, Robert J. Holt and Andrew S. H. Russell**

Mathematics Remedial Enrollment and Success Trends Queensborough Community College

	Arithmetic Enrollment	Arithmetic Success	Algebra Enrollment	Algebra Success	Combined Enrollment	Combined Success
Fall 2007	720	42%	1,508	33%	2,228	36%
Spring 2008	617	44%	1,335	32%	1,952	36%
Fall 2008	934	43%	1,608	36%	2,542	38%
Spring 2009	938	31%	1,426	30%	2,364	30%
Fall 2009	1,217	50%	1,787	32%	3,004	39%
Spring 2010	1,067	41%	1,750	28%	2,817	33%

- Students who successfully complete a developmental mathematics course have higher odds of retention¹ than those who enroll but do not successfully complete it.²
- Nationally, $\approx 60\text{-}70\%$ who took a remedial course (any subject) never earn a degree.³

1. Retention defined as first fall to first spring semester retention.
2. Fike, David S., and Renea Fike. 2008. "Predictors of First-Year Student Retention in the Community College" *Community College Review* 36, 2: 68-88.
3. Attewell, Paul, David Lavin, Thurston Domina, and Tania Levey. 2006. "New Evidence on College Remediation." *Journal of Higher Education* 77, 5: 886-924.



WARM UPS

Workshop

Approach to

Remedial (Relearning, Refreshing, Renewing, Reviewing)

Mathematics

Using

Problem

Solving

- All students take placement exam (COMPASS)
- **Target Group:** Students with similar incoming arithmetic scores (25-29)
- **Control Group:** Students in traditional class
- **Experimental Group:** Students in WARM UPS
- Students decided which course to take in consultation with their advisor.



Two Semesters' Results Fall 2009—Spring 2010

Statistics for students with incoming arithmetic score of 25-29 (Target Group)

	Passed	Total Students	Percent
WARM UPS	310	433	71.6%
Traditional	138	284	48.6%

The probability of such a difference occurring by random chance is 4.4×10^{-10} according to Fisher's exact test for a two-by-two contingency table.

- Prerequisite for experimental class was 25
- Compare “just under” and “just over”
- **Control Group:** Traditional Class w/23-24
- **Experimental Group:** WARM UPS w/25-26



Two Semesters' Results Fall 2009—Spring 2010

	Passed	Total Students	Percent
WARM UPS	137	202	67.8%
Traditional	208	451	46.1%

The probability of such a difference occurring by random chance is 1.1×10^{-6} according to Fisher's exact test for a two-by-two contingency table.

- **Control Group:** Students in Traditional Class with initial score of 23-24
- **Experimental Group:** Students in WARM UPS with initial score of 25-26

Change Everything!

- Accelerated four-week course; five hours per week
- Maximize time students spend working on problems
- Fully integrated curriculum
- One lab hour per week
- Ample in-class 1-1 instructor-student interaction
- Students who fail take workshop next four-week session
- Three sessions per semester

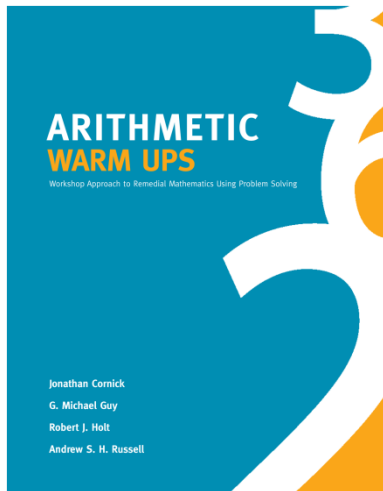
≈460 Students Responded (3 semesters)

- 88% indicated class time was sufficient
- 94% indicated labs were helpful
 - 54% of those students wanted more
- Many indicated in comments that they wanted more courses like this one

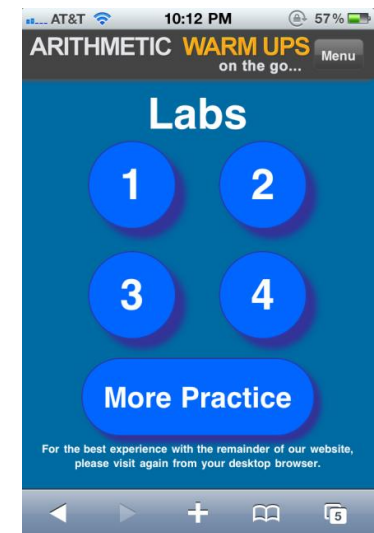
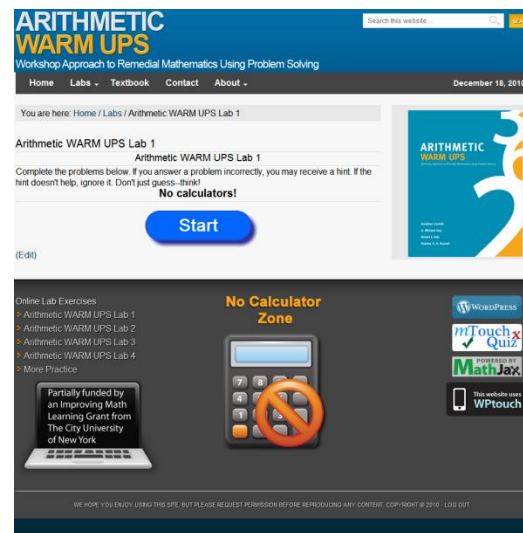
Scalable and Replicable **ACCELERATED WARM UPS**

<http://ArithmeticWARMUPS.com>

Workbook



Online Website with Labs



- Inexpensive (\approx \$35 in our bookstore)
- Published by Pearson Learning Solutions

- Free and open to all
- Optimized for desktops and mobile devices

- Expanding to all students regardless of score
- Algebra WARM UPS following Arithmetic in same semester (Modular) ¹
- Some students take next remedial course same semester
- Continue to follow the Cycle of Progress

1. Development and Assessment to be funded by a CUNY *Improve Undergraduate Learning Outcomes in Writing and/or Mathematics* grant

