Math in the Real World

Early Findings from a Study of the Dana Center Mathematics Pathways

Supplementary Tables

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CAPR | CENTER FOR THE ANALYSIS OF POSTSECONDARY READINESS

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List of Exhibits

Table

Supplementary Table S.1

Key Distinctions Between Traditional Developmental and College-Level Math Courses and DCMP

Program Component	Traditional Courses	DCMP Courses
	Acceleration	
Course structure	Two courses for students with two developmental course needs; one course for students with one developmental course need	One developmental course for students with one to two developmental course needs
	Math content	
Developmental math	Emphasizes algebraic skills	Emphasizes quantitative literacy, statistics, and algebraic reasoning skills
College-level math	Algebra	Three distinct course pathways: statistics, quantitative reasoning, and path to calculus; pathway selection based on intended major
	Instruction	
Curricular materials	Organized around discrete skills and topics[a]	Organized around broad mathematical concepts and "big ideas"
Pedagogical approach	Lecture-based[a]	Employs a variety of approaches, including small group work, class discussions, and interactive lectures; students are actively involved in analyzing data and problem solving
Constructive perseverance	Generally not a focus in math instruction[a]	Helps students develop metacognitive skills, the ability to work through challenging tasks, monitor their own learning, and understand the role of struggle in learning
Problem solving	Consists of formula or rule-based applications and rote practice using one solution method[a]	Supports the application of previously learned skills to unfamiliar and nonroutine problems; students develop multiple strategies and solution methods and share with one another
Context and interdisciplinary connections	Formulas, equations, symbols, and rules are taught as isolated math skills[a]	Math problems are connected to real-life situations and other academic disciplines; real data sets and realistic applications are used
Reading and writing	Learning is focused on equations and rote practice in applying rules and formulas; occasional word problems[a]	Develops students' ability to extract mathematics from problem situations, set up and solve the mathematical task, and interpret the result within the original context
Use of technology	Textbook-based with some use of calculators or computers[a]	Involves regular use of calculators; homework is completed via computer-based program (MyMathLab)

[a]Instructional approaches in traditional developmental math courses vary; description reflects the approach taken in many classrooms.

Supplementary Table S.2

Complete Characteristics of Students in the Study, Fall 2015 and Spring 2016 Cohorts

Characteristic	Sample Size	Program Group	Standard Group	Difference	Standard Error
Age (years)	594	23.0	23.8	-0.8	0.7
Female (%)	594	64.8	62.7	2.1	4.0
Missing		7.5	11.0	-3.5	2.4
Race/ethnicity (%)	594				
White		12.8	14.0	-1.1	2.9
Black		12.3	7.6	4.7*	2.6
Hispanic		53.1	52.5	0.5	4.2
Other		2.8	2.5	0.3	1.4
Missing		19.0	23.3	-4.3	3.4
Highest grade completed (%)	588				
8th grade or lower		1.4	1.7	-0.3	1.0
9th grade		1.1	0.9	0.3	0.8
10th grade		1.4	4.3	-2.9**	1.3
11th grade		5.1	5.2	-0.1	1.9
12th grade		91.0	88.0	3.0	2.6
Diplomas/degrees earned[a] (%)	594				
High school diploma		88.8	83.5	5.4*	2.8
GED		10.3	14.8	-4.5	2.7
Occupational/technical certificate		6.1	7.6	-1.5	2.1
Associate's degree		0.6	1.7	-1.1	0.8
Bachelor's degree		0.0	0.0	0.0	0.0
Master's degree or higher		0.3	0.0	0.3	0.3
None of the above		0.3	1.3	-1.0	0.7
Date of high school graduation/GED receipt (%)	587				
During the past year		50.0	45.0	5.0	4.2
Between 1 and 5 years ago		22.8	25.1	-2.4	3.6
Between 5 and 10 years ago		11.2	9.5	1.7	2.6
More than 10 years ago		16.0	20.3	-4.3	3.2
Planned enrollment this semester (%)	565				
Less than part time (fewer than 6 credits)		9.0	9.0	0.0	2.5
Part time (6 to 12 credits)		32.4	38.3	-5.9	4.1
Full time (12 credits or more)		58.6	52.7	5.9	4.3
Has failed a high school or college math class in the past (%)	594	34.1	34.3	-0.2	4.0
Missing		7.5	7.2	0.3	2.2

(continued)

Supplementary Table S.2 (continued)

Characteristic	Sample Size	Program Group	Standard Group	Difference	Standard Error
Math placement[b] (%)	594				
College-ready		2.2	3.0	-0.7	1.3
Placed 1 level below college-ready		14.0	14.0	0.0	2.9
Placed 2 levels below college-ready		83.0	82.2	0.8	3.2
Placed 3 levels below college-ready		0.8	0.8	0.0	0.8
Intended major (%)	591				
Science, technology, engineering, or math		3.7	5.5	-1.8	1.7
Health science		34.4	31.4	3.0	4.0
Social science		20.3	21.6	-1.3	3.4
Arts and humanities		18.3	18.2	0.1	3.3
Business and communications		7.3	6.4	1.0	2.1
Undecided		4.8	7.2	-2.4	2.0
Other		11.3	9.7	1.5	2.6
Average student agreement (1 = strongly disagree, 5 = strongly agree)					
I am confident with math	594	3.00	3.21	-0.21**	0.10
I know I can handle difficulties in math	594	3.39	3.45	-0.06	0.08
Learning math is enjoyable	590	3.19	3.28	-0.09	0.10
I know how math is needed in my future	594	4.17	4.28	-0.11	0.07
I use the math I learned in everyday life	594	3.44	3.52	-0.08	0.10
My math classes use real-life problems	592	3.50	3.44	0.06	0.08
Sample size	594	358	236		

SOURCES: Authors' calculations using data from baseline survey of students participating in the study and administrative student data. Baseline survey was administered to students immediately before random assignment, during the study intake process.

NOTES: Rounding may cause slight discrepancies in sums and differences.

Missing values are shown only for items with more than 5 percent missing values.

A two-tailed t-test was applied to differences between research groups. Statistical significance levels are indicated as follows: *** = 1 percent; ** = 5 percent; * = 10 percent.

An omnibus test for joint significance was conducted; the results indicated that the program and standard groups were not jointly significantly different on the characteristics listed above.

[a]Distributions may not sum to 100 percent because categories are not mutually exclusive.

[b]While course names vary between colleges, math courses three levels below college readiness are frequently referred to as Pre-Algebra, courses two levels down as Beginning Algebra, and courses one level down as Intermediate Algebra.

Supplementary Table S.3

Responses to All Student Survey Questions, Fall 2015 and Spring 2016 Cohorts

Response (%)	Sample Size	Program Group	Standard Group	Difference	Standard Error
Intended major or program of study	366				
Liberal arts, fine arts, and humanities		22.3	23.3	-1.1	4.4
Social sciences and social services		21.6	15.0	6.6	4.2
Nursing and health professions		29.5	28.9	0.6	4.9
Business and accounting		4.7	8.1	-3.4	2.6
Teaching and education		13.6	13.1	0.5	3.6
Science, technology, engineering, and math		5.7	10.1	-4.4	2.8
Other		2.6	1.5	1.1	1.6
Currently taking a math class	379	86.1	80.5	5.6	3.9
Among those taking a math class, reported that always or often during class					
Instructor encouraged student to find own way	*317*	*73.9*	*47.4*		
Instructor showed class multiple ways to solve problems	*317*	*77.7*	*67.3*		
Students discussed and shared strategies	*316*	*76.2*	*45.6*		
Students worked in small groups	*316*	*81.4*	*23.1*		
Students worked on problems on own	*316*	*41.1*	*69.4*		
Problems used information from real life	*315*	*68.0*	*26.4*		
Student was asked to explain work orally using math terminology	*315*	*66.6*	*30.9*		
Student had to read	*315*	*73.7*	*43.6*		
Student was asked to write out reasoning	*313*	*71.2*	*24.8*		
Student explained work to other students	*316*	*64.5*	*16.0*		
Student worked with other students on problems	*313*	*79.3*	*23.5*		
Student did not go to class	*309*	*3.2*	*3.2*		
Homework prepared student for next class	*311*	*77.5*	*65.5*		
Homework tested student's understanding	*297*	*79.5*	*60.3*		
Student used a computer in class or at home	*311*	*68.4*	*64.4*		
Among those taking a math class, difficulty of material	*312*				
Very easy		*5.2*	*10.1*		
Easy		*25.0*	*13.9*		
About right		*53.5*	*38.2*		
Difficult		*12.2*	*34.3*		
Very difficult		*4.0*	*3.6*		

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Supplementary Table S.3 (continued)

Response (%)	Sample Size	Program Group	Standard Group	Difference	Standard Error
Among those taking a math class, agreed or strongly agreed with the following statements about the class					
Class was taught using real-life problems	*310*	*84.5*	*42.4*		
You learned how to struggle through problems	*306*	*81.4*	*63.8*		
You tried to work through problems even if instructor hadn't yet taught how	*307*	*68.7*	*67.8*		
Class taught you to think more about what you're learning	*307*	*86.1*	*71.8*		
Among those taking a math class, thought the following statements were always true or mostly true					
You felt bored during class	*309*	*11.6*	*17.9*		
You paid attention during class	*309*	*91.2*	*79.9*		
You went to class unprepared	*309*	*4.0*	*4.5*		
You worked very hard on your math	*309*	*78.0*	*75.4*		
What you learned was interesting	*309*	*64.0*	*44.1*		
You use the math you learned for daily activities	*307*	*58.3*	*26.8*		
Class made you more confident in math ability	*306*	*63.8*	*55.6*		
Class increased your interest in math	*306*	*47.7*	*29.4*		
Instructor did not let people give up	*305*	*80.6*	*65.7*		
Instructor expected you to solve problems on your own	*308*	*48.5*	*37.7*		
Agreed or strongly agreed with the following statements					
Intelligence is something people are born with and can't be changed	366	9.8	10.6	-0.7	3.3
The more you work at math the better you'll be	366	59.9	64.7	-4.8	5.3
You are confident with math	367	19.5	21.9	-2.4	4.3
You know you can handle difficulties in math	364	22.1	18.2	3.9	4.4
Learning math is enjoyable	365	20.8	17.3	3.6	4.3
You understand how math will be needed in your future	367	44.4	43.8	0.6	5.4
You use the math you learned in everyday life	367	32.5	23.9	8.6*	4.8

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Supplementary Table S.3 (continued)

Response (%)	Sample Size	Program Group	Standard Group	Difference	Standard Error
Among those not taking a math class, time since last math class	*59*				
Within the last 3 months		*14.5*	*5.0*		
Between 3 and 6 months		*20.8*	*19.8*		
More than 6 months but less than a year		*23.8*	*20.0*		
More than a year ago, but less than 2 years		*29.4*	*13.3*		
Two or more years		*13.2*	*28.9*		
Missing		*-1.6*	*13.0*		
Among those not taking a math class, last math class taken	*57*				
High school math class		*41.9*	*62.4*		
College math class offered at site		*47.6*	*19.1*		
College math class offered elsewhere		*4.6*	*14.1*		
Online math class		*5.9*	*4.4*		
Sample size	382	235	147		

SOURCE: Authors' calculations from DCMP survey fielded to students at Brookhaven, Eastfield, El Paso, and Trinity Valley Community Colleges.

NOTES: This survey was fielded to both the fall 2015 and spring 2016 cohorts during the spring 2016 semester. The survey asked students in the spring 2016 cohort to consider their current math class when responding to questions, while students in the fall 2015 cohort were asked to think about their math class from the previous semester.

The survey was fielded to 594 students. The overall response rate was 64 percent (66 percent in the program group and 62 percent in the standard group). Survey fielding to students in later cohorts of the study is ongoing. A later report will include additional details about the full sample.

Rounding may cause slight discrepancies in sums and differences.

Missing values are shown only for items with more than 5 percent missing values.

Estimates are adjusted by site-cohort differences.

A two-tailed t-test was applied to differences between research groups. Statistical significance levels are indicated as follows: *** = 1 percent; ** = 5 percent; * = 10 percent.

Values shown in italics are calculated for a subset of the full sample. Differences and statistical significance are not calculated for these values.