THE LEARNING COMMUNITIES DEMONSTRATION

Learning Communities for Students in Developmental Math

Impact Studies at Queensborough and Houston Community Colleges

Evan Weissman
Kristin F. Butcher
Emily Schneider
Jedediah Teres
Herbert Collado
David Greenberg

FEBRUARY 2011

National Center for Postsecondary Research
www.PostsecondaryResearch.org

Learning Communities for Students in Developmental Math

Impact Studies at Queensborough and Houston Community Colleges

Evan Weissman
Kristin F. Butcher
Emily Schneider
Jedediah Teres
Herbert Collado
David Greenberg

(MDRC)

With

Rashida Welbeck

February 2011

National Center for Postsecondary Research
www.PostsecondaryResearch.org

The National Center for Postsecondary Research is a partnership of the Community College Research Center, Teachers College, Columbia University; MDRC; the Curry School of Education at the University of Virginia; and faculty at Harvard University.

The National Center for Postsecondary Research (NCPR) was established by a grant (R305A060010) from the Institute of Education Sciences of the U.S. Department of Education. The Learning Communities Demonstration is also supported by the Bill & Melinda Gates Foundation, the Ford Foundation, the Kresge Foundation, Lumina Foundation for Education, and the Robin Hood Foundation.

Dissemination of MDRC publications is supported by the following funders that help finance MDRC's public policy outreach and expanding efforts to communicate the results and implications of our work to policymakers, practitioners, and others: The Ambrose Monell Foundation, The Annie E. Casey Foundation, Carnegie Corporation of New York, The Kresge Foundation, Sandler Foundation, and The Starr Foundation. In addition, earnings from the MDRC Endowment help sustain our dissemination efforts.

Contributors to the MDRC Endowment include Alcoa Foundation, The Ambrose Monell Foundation, Anheuser-Busch Foundation, Bristol-Myers Squibb Foundation, Charles Stewart Mott Foundation, Ford Foundation, The George Gund Foundation, The Grable Foundation, The Lizabeth and Frank Newman Charitable Foundation, The New York Times Company Foundation, Jan Nicholson, Paul H. O'Neill Charitable Foundation, John S. Reed, Sandler Foundation, and The Stupski Family Fund, as well as other individual contributors.

The contents of this report were developed under a grant (R305A060010) from the Institute of Education Sciences, U.S. Department of Education. However, those contents do not necessarily represent the policy of the Institute or the U.S. Department of Education, and you should not assume endorsement by the federal government. The findings and conclusions in this report do not necessarily represent the official positions or policies of the funders.

For information about NCPR and NCPR publications, visit www.postsecondaryresearch.org.
For information about MDRC and MDRC publications, visit www.mdrc.org.

Overview

Community colleges now serve over one-third of our nation's postsecondary students each year. Because they have open admissions and are relatively low cost, they enroll larger percentages of low-income students than four-year institutions. Unfortunately, as enrollment in these colleges has increased, students' success rates have not kept pace. One of the major barriers for academically underprepared students is the need to pass developmental (or remedial) math classes. These classes do not offer college credits, and rates of completing and passing them are low. Learning communities are a popular strategy for moving students through the developmental math sequence. They enroll a cohort of students in two classes and often incorporate shared assignments and curricula, collaboration between faculty teaching pairs, and connections to student support services.

Queensborough Community College and Houston Community College are two large, urban institutions that offer learning communities for their developmental math students, with the goals of accelerating students' progress through the math sequence and of helping them to perform better in college and ultimately earn degrees or certificates. They are two of six colleges participating in the National Center for Postsecondary Research's Learning Communities Demonstration, in which random assignment evaluations are being used to determine the effects of learning communities. At Queensborough, classes in all levels of developmental math were linked primarily with college-level classes, and at Houston, the lowest level of developmental math was linked with the college's student success class, designed to prepare students for the demands of college. A total of 1,034 students at Queensborough and 1,273 students at Houston entered the study between 2007 and 2009. The key findings presented in this report are:

- **Both Queensborough and Houston began by implementing a basic model of a one-semester developmental math learning community**; the programs strengthened over the course of the demonstration by including more curricular integration and some connections to student support services.

- **Learning community students attempted and passed their developmental math class at higher rates at both colleges**.

- **In the semesters following students' participation in the program, impacts on developmental math progress were far less evident**. By the end of the study period (three semesters total at Queensborough and two at Houston), control group members at both colleges had largely caught up with learning community students in the developmental math sequence.

- **On average, neither college's learning communities program had an impact on persistence in college or cumulative credits earned**.

With these results, a pattern is beginning to emerge in the experimental research on learning communities: Linked classes can have an impact on students' achievement during the program semester, but this effect diminishes over time. However, a fuller understanding will be gained as findings are released from the remaining three colleges in the demonstration. A final project synthesis report, including further follow-up, will be published in 2012.

Table of Contents

Overview iii
List of Tables, Figures, and Boxes vii
Preface ix
Acknowledgments xi
Executive Summary ES-1

Chapter

1 Introduction 1
Background 3
Overview of the Learning Communities Demonstration 6
What Impacts Can Be Expected from Learning Communities for Students in Developmental Math 9
Organization of This Report 12

2 The Colleges, the Study Sample, and Data Sources 13
The Participating Colleges and Their Environments 13
Developmental Math at the Colleges 15
Recruiting and Enrolling Students in the Study 17
Characteristics of the Sample 19
A Note on the Random Assignment Design 22
Data Sources and Follow-Up Periods 23

3 The Learning Communities Program at Queensborough Community College 27
The Program Model: A "Basic" Model for Students at Both Levels of Developmental Math 28
How Did Students Get into the Learning Communities? 29
How Comprehensive Were the Learning Communities at Queensborough? 32
How the Learning Community Experience Differed from Regular Services for Developmental Students 40
Summary 44

4 Program Impacts on Educational Outcomes at Queensborough Community College 45
Key Impact Findings 45
Research Methods 46
Results for the Full Sample 49
Summary of Results for the Full Sample 56

Subgroup Analyses 57
Summary of Queensborough Community College Results 63

5 The Learning Communities Program at Houston Community College 65
The Program: A "Basic" Model for Students at the Lowest Level of Developmental Math 67
How Did Students Get into the Learning Communities? 70
How Comprehensive Were the Learning Communities at Houston? 71
The Cost of Running Learning Communities at Houston 80
How the Learning Community Experience Differed from Regular Services for Students in Need of Developmental Math 86
Summary 90

6 Program Impacts on Educational Outcomes at Houston Community College 91
Key Impact Findings 91
Research Methods 92
Results for the Full Sample 92
Subgroup Analyses 97
Summary of the Houston Results 102

7 Conclusions and Reflections 107
Does Prompt Enrollment in Developmental Math Drive Further Success? 108
Does Initial Success in Developmental Math Lead to Continued Progress in the Sequence? 109
Does Early Progress in the Math Sequence Lead to Improvements in Other Outcomes? 110
What About Student Engagement and Deeper Learning? 110
Does a Certain Type of Student Benefit Most from Developmental Learning Communities? 111
What's Next for Learning Communities? 112
Can the Effects of Learning Communities Be Improved or Sustained? 113
Looking Ahead in the Learning Communities Demonstration 113

Appendix A: Supplementary Tables 115

References 137

Related Publications on Learning Communities 141

List of Tables, Figures, and Boxes

Table

1.1	Overview of the Learning Communities in the Learning Communities Demonstration, by College	8
2.1	Selected Characteristics of Queensborough Community College and Houston Community College	14
2.2	Developmental Math Course Content	16
2.3	Developmental Math Courses and Placement Scores	18
2.4	Characteristics of Sample Members at Baseline	20
2.5	Semesters of Enrollment in the Learning Communities Study	25
3.1	Queensborough Faculty Development Activities	34
3.2	Queensborough Course-Taking Patterns, Program Semester	42
3.3	Queensborough Program Differential during Semesters 2-4	43
4.1	Queensborough Transcript Outcomes, Math Progression	50
4.2	Queensborough Transcript Outcomes, Credit and Persistence Measures	55
4.3	Queensborough Transcript Outcomes by Cohort, Math Progression	58
4.4	Queensborough Transcript Outcomes by Cohort, Credit and Persistence Measures	61
5.1	Houston Faculty Development Activities	69
5.2	Houston Community College Learning Communities: Estimated Net Aggregate and per Program Member Costs During the Fall 2009 Semester	82
5.3	Program Differential at Houston	87
5.4	Houston Course-Taking Patterns, Program Semester	88
6.1	Houston Transcript Outcomes, Math Progression	93
6.2	Houston Transcript Outcomes, Credit and Persistence Measures	96
6.3	Houston Transcript Outcomes by Placement Test Score, Math Progression	100

(continued)

Table

6.4	Houston Transcript Outcomes by Placement Test Score, Credit and Persistence Measures	103
A.1	Queensborough: Results of Learning Community Syllabi Analysis	117
A.2	Queensborough Transcript Outcomes by Placement Test Score, Math Progression	118
A.3	Queensborough Transcript Outcomes by Placement Test Score, Credit and Persistence Measures	120
A.4	Queensborough Transcript Outcomes by Gender, Math Progression	123
A.5	Queensborough Transcript Outcomes by Gender, Credit and Persistence Measures	125
A.6	Houston: Results of Learning Community Syllabi Analysis	127
A.7	Houston Transcript Outcomes by Cohort, Math Progression	128
A.8	Houston Transcript Outcomes by Cohort, Credit and Persistence Measures	130
A.9	Houston Transcript Outcomes by Gender, Math Progression	132
A.10	Houston Transcript Outcomes by Gender, Credit and Persistence Measures	134

Figure

ES.1	Queensborough Math Outcomes	ES-5
ES.2	Houston Math Outcomes	ES-7
3.1	Queensborough: Learning Community Structures, Change over Time (Semester 1 versus Semesters 2-4)	30
3.2	Queensborough: Average Scores on Two Dimensions from an Assessment of Learning Community Syllabi: Fall 2007-Spring 2009	38
3.3	Queensborough Faculty Numbers	40
5.1	Houston: Average Scores on Two Dimensions from an Assessment of Learning Community Syllabi: Spring 2008-Fall 2009	78

Box

4.1	How to Read the Impact Tables in This Report	52

Preface

Community colleges are increasingly becoming the most important pathway to higher education for millions of low-income, minority, and other students. Although enrollment in community colleges is soaring — more than a third of all students in higher education institutions in 2007-2008 attended community colleges — only a small percentage of these students are earning associate's or bachelor's degrees. There are a number of reasons for their low rates of success, including work and family obligations and part-time attendance. The most important challenge for the majority of community college students may be that they are academically underprepared for college.

Learning communities, which co-enroll small groups of students into linked courses, are a popular strategy for helping community college students pass their classes and ultimately earn a credential or transfer to a four-year institution. To test whether learning communities are effective, the National Center for Postsecondary Research (NCPR) launched the Learning Communities Demonstration, a study of different models of learning communities at six community colleges across the nation. MDRC is leading the study as part of its participation in NCPR, a partnership funded by a grant (R305A060010) from the Institute of Education Sciences, U.S. Department of Education. NCPR also includes the Community College Research Center at Columbia University's Teachers College, the Curry School of Education at the University of Virginia, and faculty at Harvard University.

This report examines the impacts of one-semester developmental math learning communities at Queensborough Community College in New York and Houston Community College in Texas, where college administrators recognized the need to help students progress through required developmental (or remedial) math courses, which do not offer college credits. The goals of these learning communities were to change how material is taught in the classroom by offering context for the skills and knowledge acquired in each class, to strengthen students' relationships with faculty and classmates, and to ultimately increase their rates of academic success. The learning communities at both colleges were relatively basic in scope. They enrolled groups of students in two classes — developmental math and either a college-level class or a college success class aimed at preparing students for the demands of college. But in the earlier stages of the demonstration, curricular integration between the classes in the learning communities was limited, and connections to support services were not common.

Although there were differences between the two colleges' programs, the students they served, and how each college implemented and strengthened its learning communities program over the life of the demonstration from 2007 to 2009, the findings at the two colleges were similar. Students in the learning communities group attempted and passed their developmental

math classes at higher rates than students in a control group, and they began the next semester a "step ahead" in the math sequence. However, this impact generally did not translate into increased cumulative progress in math by the end of two or three semesters. Furthermore, the programs had no impact on students' persistence in college or the cumulative credits they earned.

The results at these colleges, alongside other NCPR and earlier evaluations of learning communities, are helping us to better understand the possible benefits and limitations of these programs. A shortcoming of basic one-semester learning communities for students in developmental classes is that they seem to benefit students while they are participating in the program, but do not necessarily result in increases in important longer-term outcomes.

The next reports in the Learning Communities Demonstration will present the impacts at three additional colleges whose learning community program models were generally more ambitious. A final report in 2012 will examine trends across the six colleges, look for impacts which may occur with longer follow-up, and reflect on the body of evidence on the effectiveness of learning communities.

Gordon L. Berlin
President, MDRC

Acknowledgments

The authors would like to begin by thanking the students and instructors at Queensborough and Houston Community Colleges. This demonstration would not have been possible without their hard work and willingness to participate in the study.

While it would be impossible to name all of the individuals who supported the project at each college, we would like to single out a few who were primarily responsible for building up their learning community programs, recruiting and supporting instructors, reaching out to and enrolling students, and maintaining random assignment procedures: Susan Madera, Michele Cuomo, and Brian Kerr at Queensborough Community College, and Chyrell Botts, Beverly Hixon, Elaine Krieg, Patricia Ugwu, Patrick Nguyen, Lois Avery, Cheryl Peters, Maria Straus, and Elvia Sanchez at Houston Community College. Thanks are also due to Elizabeth Gordon, Alix Safir, and Maria Casey at Queensborough, and Edgar Chucle, Maria Garcia, and Ron Agatep at Houston for providing student records data and helping us understand those data.

The Learning Communities Demonstration is part of the National Center for Postsecondary Research (NCPR), which is supported by a grant (R305A060010) from the Institute of Education Sciences, U.S. Department of Education. The project received additional support from funders listed at the front of this report, but we would like to especially thank the Robin Hood Foundation for its support of Queensborough, and Lumina Foundation for Education for its support of Houston through the Achieving the Dream initiative. NCPR is a collaborative effort between several organizations, including MDRC, the Community College Research Center at Columbia University's Teachers College, the University of Virginia, and faculty at Harvard University. In addition to ongoing advice and support of the project, Thomas Bailey of the Community College Research Center provided useful review and guidance on drafts of this report.

Finally, we are grateful to the large project team who worked alongside the authors and played critical roles in the Learning Communities Demonstration and at the Queensborough and Houston sites. Thomas Brock, Rob Ivry, and Mary Visher led the design and management of the overall project and reviewed this report. Michelle Ware helped launch the study at Houston, conducted field research, provided the college with assistance to strengthen its program, and with the help of Kendris Brumfield, implemented random assignment procedures. Christine Patton, Mary Visher, Heather Wathington, and Michael Weiss all conducted field research. Kate Gualtieri managed the budget for the demonstration. Melinda Jackson provided administrative support. Hannah Fresques helped process, fact-check, and present the student records data, and Amanda Grossman helped collect and present data on program costs. Michael Weiss, Lashawn Richburg-Hayes, and Colleen Sommo provided invaluable insight and advice on the

analysis. Dan Bloom, John Hutchins, and Charles Michalopoulos reviewed drafts of the report. Phoebe Richman coordinated the report through the final stages of review, editing, and fact-checking. Margaret Bald edited the report, and David Sobel and Stephanie Cowell prepared it for publication. This report could not have come to fruition without the full Learning Communities Demonstration team; we thank them all.

The Authors

Executive Summary

Community colleges offer great promise to students in the United States. Every fall, about 34 percent of our nation's postsecondary students enroll in these open-entry institutions, which are typically more affordable than four-year colleges and universities. Unfortunately, as enrollment in these essential institutions has increased over time, overall success rates have not kept pace; only about half the students who enroll in community college with the intention of earning a credential or transferring to a four-year institution meet that goal within six years. Students who are academically underprepared for college-level work succeed at even lower rates, particularly those who are referred into developmental math.

Developmental math — prerequisite courses that are intended to prepare students for college-level math but do not offer credits that count toward a degree or transfer — is a major barrier to college success for many students. These students often cannot achieve their college goals without passing through the developmental math sequence, but may be unable or unwilling to attempt and pass the required math classes. In response to this problem, community colleges and other stakeholders are beginning to suggest and implement a range of strategies to move students more successfully through the developmental sequence. Learning communities are a popular and prominent approach being implemented across the nation.

The most basic learning community model co-enrolls a cohort of students in two classes together. More comprehensive learning communities include additional components; for example, courses are often thematically linked and may share curriculum, assignments, and assessments. Proponents of learning communities believe that linking courses will lead to better outcomes for students in two ways: first, by strengthening relationships among students and between students and faculty, and second, by changing how material is taught in the classroom by contextualizing the skills and knowledge taught in each course. For students in developmental math, a primary short-term goal of learning communities is to accelerate students' progression through the math sequence and into college-level coursework. A longer-term goal is that enrolling in developmental math learning communities will increase students' ultimate likelihood of earning a credential or transferring to a four-year institution.

Queensborough Community College and Houston Community College are two large, urban institutions that have implemented developmental math learning communities with these goals in mind. At each school, cohorts of 20 to 25 students co-enrolled in developmental math and a linked course; at Queensborough, all levels of developmental math were linked primarily with college-level courses, and at Houston, the learning communities linked the lowest level of developmental math with the college's student success course, which is designed to prepare students for the demands of college.

These colleges are two of the six participating in the National Center for Postsecondary Research's (NCPR) Learning Communities Demonstration.[1] The demonstration at these colleges was designed to determine whether the programs succeeded in boosting their students' success. The study used an experimental design in which students who were interested and eligible for the courses included in the learning community were randomly assigned to either a program group, whose members were strongly encouraged to participate in the learning communities, or to a control group, whose members received the college's standard services. The impact of the learning communities program is estimated by comparing the academic outcomes of students in both groups for two to three semesters after random assignment. This report presents impact findings for Queensborough and Houston's developmental math learning communities; other reports in the series describe the demonstration more broadly and present detailed findings for the other colleges.[2]

The key findings presented in this report are:

- **Both Queensborough and Houston began by implementing a basic model of a semester-long developmental math learning community; the programs strengthened over the course of the demonstration by including more curricular integration and some connections to student support services.**

Throughout the demonstration, the learning community programs at Queensborough and Houston successfully co-enrolled groups of students into both courses in the learning communities; students and faculty at both schools, and particularly at Houston, reported that students felt supported both personally and academically as a result of these cohorts.

---

[1]MDRC, in partnership with the Community College Research Center at Columbia University's Teachers College, the Curry School of Education at the University of Virginia, and faculty at Harvard University, created NCPR through a grant (R305A060010) from the Institute of Education Sciences, U.S. Department of Education. Several foundations provided additional support to the Learning Communities Demonstration: the Bill & Melinda Gates Foundation, the Ford Foundation, the Kresge Foundation, Lumina Foundation for Education, and the Robin Hood Foundation.

[2]For more details on the purpose and design of the Learning Communities Demonstration, see Mary G. Visher, Heather Wathington, Lashawn Richburg-Hayes, and Emily Schneider, *The Learning Communities Demonstration: Rationale, Sites, and Research Design*. An NCPR Working Paper (New York: National Center for Postsecondary Research, 2008). For a description of the early implementation experiences of the colleges in the demonstration, see Mary G. Visher, Emily Schneider, Heather Wathington, and Herbert Collado, *Scaling Up Learning Communities: The Experiences of Six Community Colleges* (New York: National Center for Postsecondary Research, 2010). For impact findings for Hillsborough Community College's developmental reading learning communities, see Michael J. Weiss, Mary G. Visher, and Heather Wathington, *Learning Communities for Students in Developmental Reading: An Impact Study at Hillsborough Community College* (New York: National Center for Postsecondary Research, 2010). Forthcoming reports will present impact findings for Kingsborough Community College, Merced College, and The Community College of Baltimore County.

However, curricular integration and faculty collaboration — the other key components of comprehensive learning communities — were initially fairly minimal at both schools and increased over time as a result of leadership by program coordinators, growing faculty experience, and participation in professional development activities. By the end of the demonstration at Queensborough, many of the learning communities had themes supported by several assignments that integrated content across both courses. At Houston, faculty began to include at least three integrated assignments in their courses and included additional informal linkages between the courses. Both programs also explored promising means of using the learning communities to connect students to available support services at the campuses, such as counseling and tutoring.

The level of curricular integration at both schools remained closer to the basic end of the spectrum when compared with the most robust learning communities discussed in the literature; nevertheless, the maturation of each program led to increasing differences between the experience of students in the learning communities and their counterparts in the control group. These differences were achieved at a relatively modest cost above that of standard classes: At Houston, program expenditures were about $120 per student, plus another $80 associated with increased use of tutoring and other services.

- **Learning community students attempted and passed their developmental math class at higher rates at both colleges.**

When Queensborough and Houston launched their learning communities, one of the short-term goals of college administrators was to encourage and assist students in beginning the developmental math sequence early in their college tenure. Both colleges succeeded in this goal, as the offer to participate in learning communities led to significantly higher rates of enrollment in the developmental math courses that were part of the learning communities.

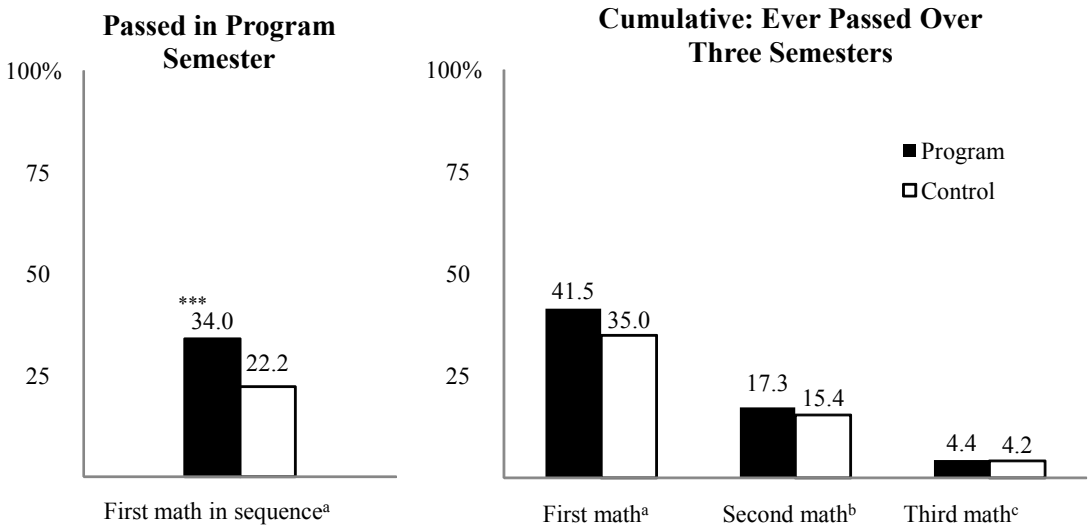
Students in the learning communities at both colleges also passed developmental math at higher rates than their control group counterparts, an important first step toward further success. These pass rates are compared in the first set of bars in Figures ES.1 and ES.2. At Queensborough, this result was driven largely by higher rates of enrollment in the learning communities; at Houston, the higher pass rates were driven both by higher attempt rates and by the fact that students who attempted math in learning communities were more likely to pass the course than those who attempted the same coursework in stand-alone classes. Possible explanations for this increased performance in the course could be that the student success course at

The Learning Communities Demonstration

Figure ES.1

Queensborough Math Outcomes

Learning Communities for Students in Developmental Math



SOURCE: MDRC calculations from Queensborough Community College transcript data.

NOTES: Students who did not take the COMPASS pre-algebra placement test before being randomly assigned are excluded from this table.

Rounding may cause slight discrepancies in sums and differences.

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

The probability of being assigned to the treatment group varies within cohorts, and estimates are weighted to account for the different random assignment ratios. Standard errors are clustered by learning community link.

Estimates are adjusted by cohort and score on the pre-algebra placement test at baseline.

All measures are based on courses that sample members are still enrolled in at the end of the add/drop period.

Cumulative outcomes include summer terms.

[a]Includes MATH 005 for those placed into MATH 005 at baseline. Includes MATH 010 and MATH 013 for those placed into MATH 010/013.

[b]Includes MATH 010 and 013 for those placed into MATH 005 at baseline. Includes MATH 114, 120, 301, and 321for those placed into MATH 010/013.

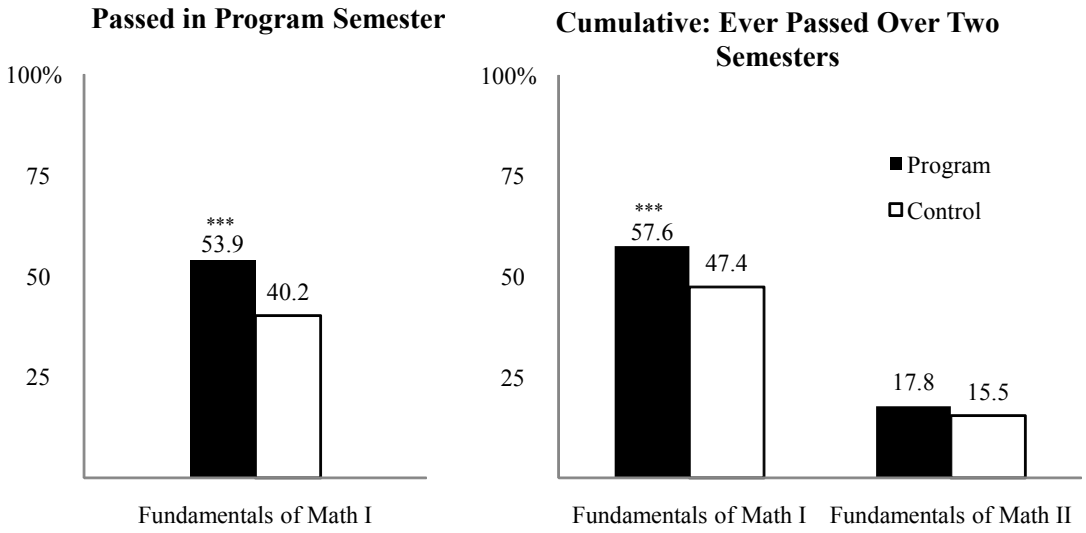
[c]Includes MATH 114, 120, 301, and 321 for those placed into MATH 005 at baseline. Includes MATH 128, 260, 303, 336, and 440 for those placed into MATH 010/013.

The Learning Communities Demonstration

Figure ES.2

Houston Math Outcomes

Learning Communities for Students in Developmental Math



SOURCE: MDRC calculations from Houston Community College transcript data.

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

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

The probability of being assigned to the treatment group varies within cohorts, and estimates are weighted to account for the different random assignment ratios. Standard errors are clustered by learning community link.

Estimates are adjusted by cohort, campus, and score on the pre-algebra placement test at baseline.

All measures are based on courses that sample members are still enrolled in at the end of the add/drop period.

Cumulative outcomes include summer terms.

Houston gave learning communities students the study skills they needed to better succeed in math or that the high levels of student engagement and peer support arising from co-enrollment were particularly beneficial for students in Houston's diffuse setting. Another explanation could be that the teachers in these learning communities were more likely to give their students passing grades, either as a result of more effective teaching methods or simply of more generous grading curves.

Interestingly, and perhaps as a result of the different placement test cut scores used, students at Houston — who were generally placed into a lower-level math course — experienced higher overall pass rates (for both the program and control groups) than students at Queensborough, where equal scores could place students into a course with more advanced material.

Regardless of the differences between colleges or the explanation for these differences, students in learning communities at each college were more likely than their control counterparts to enter the next semester a "step ahead" in the math sequence.

- **In the semesters following program participation, impacts on developmental math progress were far less evident. By the end of the study period, control group members at both colleges had largely caught up with learning community students in the developmental math sequence.**

In the first postprogram semester, learning community students at both colleges were more likely to attempt the next level of developmental math, but only at Queensborough were they significantly more likely to pass the course.

Additional students (in both the program and control groups) also continued to pass the first math class in the sequence in later semesters, so that the overall percentage that passed the class increased. At Queensborough, by the end of the second postprogram semester (three semesters total), control group members had caught up and "closed the gap" in terms of passing the first math class in the sequence, so that program group members were not significantly more likely than control group members to have passed the class. This cumulative math outcome for Queensborough is shown in the right set of bars in Figure ES.1. (The 6.5 percentage point difference between program and control group members' pass rates was not large enough to give the researchers confidence that the impact did not occur by chance; this lack of statistical significance is indicated by the lack of asterisks over the bars.)

As further shown in the right-hand set of bars in Figure ES.1, by the end of the second postprogram semester, fewer than 20 percent of Queensborough students in the study had passed their second math course in the required sequence, and fewer than 5 percent had passed the third course in the sequence. There were no significant differences between program and control group members' math pass rates.

A similar pattern of control group members catching up to program group members can be observed at Houston, although only two semesters of data are available. As at Queensborough, fewer than 20 percent of students in the study sample went on to pass the second math class in the sequence, and there was no significant difference between program and control-group members' pass rates — though in the first postprogram semester learning communities

students maintained an advantage over their control group counterparts in passing the first math class in the sequence. (See Figure ES.2)

Overall, at these two colleges learning communities clearly led students to take and pass developmental math earlier in their college careers, but this impact generally did not translate into increased cumulative progress along the math sequence by the end of the two or three semesters studied. Moreover, there is evidence that some of the initial progress along the developmental math sequence at Houston represents a substitution away from developmental English courses; thus, there was no increase in overall developmental credits earned by learning communities students at Houston. This enrollment trade-off between developmental math and developmental English may serve as a reminder of the constraints community college students face in their time and ability to tackle multiple courses.

- **On average, neither college's learning communities program had an impact on persistence in college or on cumulative credits earned.**

In addition to examining progress through the developmental math sequence, this study measures two key indicators of long-term success: persistence in college and credit accumulation, both of which are necessary steps on the path to earning a degree or credential or transferring to a four-year institution. At the end of the study period covered in this report, neither college had achieved measurable impacts on these outcomes.

Thus, while the learning communities at Queensborough and Houston gave students a significant boost in their start along the developmental math sequence, this initial boost does not appear sufficient on its own to generate improvements in longer-term measures of success.

- **Some subgroups of students may have benefited more from the developmental math learning communities.**

Subgroup analyses conducted for students at Queensborough and Houston suggest that the program effects differed somewhat between some groups of students, but there is no subgroup or type of student that clearly or consistently benefits the most from developmental math learning communities.

At Houston, the most encouraging program impacts were seen for students who placed in the lower half on the math placement test in relation to other students in the course. In addition to the increased progress along the math sequence that was seen for the full sample, there were also indications that students with lower-level math skills were earning more credits overall than their control counterparts. Although this impact was apparent in the program semester, there was no significant impact on credits earned in the postprogram semester. At Queensborough, a similar analysis did not show any differences based on level of math placement.

Placing These Findings in a Broader Context

The findings presented in this report, along with previous rigorous research on learning communities, show a similar pattern of impacts. Basic semester-long learning communities for students in developmental classes have the potential to significantly increase students' success in the program semester, but these impacts — the differences between students in learning communities and students in regular stand-alone classes — diminish sharply over the semesters after program participation ends, as students in the control group catch up with those in the program group. While any progress in helping students initially move more quickly through the developmental sequence is promising, it appears that semester-long learning communities alone cannot be expected to help large numbers of students progress through the developmental sequence and into the college-level courses that are typically required for a degree or transfer.

The literature on learning communities also points to other routes to success for students in learning communities: These programs could boost persistence and success by providing students with a sense of engagement with the institution, as well as by facilitating deeper learning. However, while students and faculty reported that students in the learning communities at Queensborough and Houston felt supported both personally and academically, this did not translate into a measurable increase in their likelihood to persist in college. Similarly, the lack of longer-term impacts on passing classes further along the math sequence or on cumulative credits earned, suggests that there was not a substantial sustained effect on learning. However, without post-test scores for all sample members, it is impossible to know for certain whether deeper learning was engendered by Queensborough's and Houston's learning communities.

It is important to remember that the learning communities programs in this study were — on the whole — relatively basic models compared with the comprehensive theoretical models in the literature, which feature extensive and consistent faculty collaboration, curricular integration, and integrated student supports. However, anecdotal evidence suggests that the majority of learning communities programs nationally — like those in the Learning Communities Demonstration — do not consistently implement all of the components in an advanced model and generally experience variation or fluctuation within the programs and over time.

Looking Ahead

With findings from three of the six community colleges in the Learning Communities Demonstration released to date, there is still a much fuller understanding to be gained. Subsequent reports on the remaining colleges will present results on Kingsborough Community College's learning communities, which target continuing students in several career tracks, and on the developmental English learning communities at Merced College and The Community

College of Baltimore County (CCBC). These three colleges generally implemented learning communities with more advanced teacher collaboration, integration, or student support services than the first three colleges in the demonstration. It is important to note, though, that the variation in instructional strategies and strength of program implementation seemed at least as great across teaching teams within each college as between the six colleges.

A final report scheduled to be released in 2012 will synthesize findings across all six colleges in order to provide more rigorous evidence on the effectiveness of learning communities. This final report will reflect on these findings, discuss them in the context of any other new research on learning communities, and present the results of additional analyses. Some results will be pooled across colleges and further follow-up on students from two or more colleges will be conducted to look for impacts that might continue or emerge after the two to three semesters of data analyzed in the initial reports. The program costs and effects at Houston — as well as for learning communities at CCBC — will also be analyzed further to help determine whether any longer-term effects of the program outweigh the costs.

Chapter 1

Introduction

How many yards of material from a 24-yard length of cloth remain after 3 pieces, each 3½ yards long, and 5 pieces, each 2¼ yards long, are removed?

A. $2\frac{1}{4}$
B. $4\frac{1}{4}$
C. $4\frac{5}{6}$
D. $10\frac{1}{4}$
E. $10\frac{5}{6}$

Students entering community colleges across the country encounter placement tests with a slew of questions similar to the one above.[1] Many of these students are surprised that they need to take the test, are unprepared academically to answer the questions, or are unaware of the consequences of doing poorly on the test. Those who can answer questions like the one above are on their way to passing their college's requirements for "college-level" math, and if they do well enough on the test, can begin coursework in the first college-level math class. Those who cannot are typically referred to "developmental" math — prerequisite classes intended to prepare students for college-level math, which do not offer credits that count toward a degree or transfer. These students referred to developmental math have some of the nation's lowest rates of college success.[2]

Queensborough Community College and Houston Community College attempted to raise the success rates for their students in need of math remediation by implementing learning communities, in which cohorts of about 20 to 25 students together took developmental math and a second linked class. This report presents results from random assignment evaluations of each program. Queensborough and Houston are two of the six community colleges in the national Learning Communities Demonstration; earlier reports from this demonstration include *Scaling Up Learning Communities: The Experiences of Six Community Colleges*[3] and *Learning Communities for Students in Developmental Reading: An Impact Study at Hillsborough Community College*.[4] The Learning Communities Demonstration is a research project being conducted by the

[1] ACT, Inc. (2010). The correct answer is A.
[2] Adelman (2004).
[3] Visher, Schneider, Wathington, and Collado (2010).
[4] Weiss, Visher, and Wathington (2010).

National Center for Postsecondary Research (NCPR). MDRC, in partnership with the Community College Research Center (CCRC) at Columbia University's Teachers College, the Curry School of Education at the University of Virginia, and faculty at Harvard University, established NCPR through a grant (R305A060010) from the Institute of Education Sciences, U.S. Department of Education. Several foundations provided additional support to the Learning Communities Demonstration.[5]

Queensborough Community College is a racially and ethnically diverse urban college in Queens, New York, serving about 13,000 students each semester. Before Queensborough entered the demonstration, the college offered learning communities for upper-level and honors courses. Upon entering the demonstration, Queensborough launched learning communities that linked developmental math with a variety of other courses, primarily at the college level. These developmental math learning communities were targeted largely to first-time students with the goal that these students would take developmental math while earning college credit in another course. The linked structure of the learning community would serve to strengthen their connections with other students and faculty and boost their college success. Over the four semesters of the demonstration, 1,034 students at Queensborough chose to participate in the study; about 60 percent of these students were randomly assigned to the program group and were offered the opportunity to enroll in one of 26 learning communities offered by the college.

Houston Community College is a very large and diverse urban college in Houston, Texas, with over 50,000 students on its many campuses spread across one of the country's most sprawling cities. Over 70 percent of the general student population at Houston attend part time (in contrast to Queensborough, where just over half attend full time). Before Houston entered the demonstration, the college began participating in Achieving the Dream, a national initiative to promote data-driven reform in community colleges, with a special focus on low-income students and students of color.[6] Houston's participation in the initiative led college leaders to examine student records and note that a large number of students in need of developmental math put off taking these classes until late in their college career, and when students took these classes their failure rates were high. To counteract this trend, Houston chose to offer learning communities for first-year students in the lowest-level developmental math course, linking this course with a student success course that is required for all students and designed to prepare students for the demands of college. The goal of linking these two courses was to encourage students at the lowest level of math to begin tackling their developmental coursework early, while providing support and a cohort structure to boost pass rates and counteract the estrange-

[5]The following foundations generously supported this project: the Bill & Melinda Gates Foundation, the Ford Foundation, the Kresge Foundation, Lumina Foundation for Education, and the Robin Hood Foundation.

[6]Achieving the Dream: Community Colleges Count is a national initiative funded by Lumina Foundation for Education. By 2010, 130 community colleges had joined the initiative.

ment and sense of anonymity that can be hard to overcome at such a large commuter institution. At Houston, 1,273 students took part in the study; about 60 percent were randomly assigned to the program group and were offered the opportunity to enroll in one of 33 learning communities available over the four semesters of the demonstration.

Both Queensborough and Houston began the study by implementing a basic model of semester-long developmental math learning communities, comprised primarily of co-enrolling groups of students into the two courses. Faculty teaching pairs collaborated occasionally, and as a result, there were a limited number of curricular connections between most courses. Each program strengthened over the course of the demonstration, as program coordinators raised expectations and provided more professional development opportunities for faculty; this led to increases in curricular integration in many of the learning communities at each college, as well as some stronger connections to student support services on campus. While the most robust learning community models in the literature include these key elements more extensively and deeply, anecdotal evidence suggests that the variation and fluctuation of the learning communities programs at Queensborough and Houston are comparable to many of the programs currently being implemented in community colleges across the country.[7]

After briefly discussing the background and context for the national Learning Communities Demonstration, this report will describe in more depth the features and implementation of the programs at Queensborough and Houston. Student academic outcomes and program impacts — changes over and above what students would have achieved in the college's standard classes and services — are presented from the semester during which students were enrolled in the program, as well as from one to two full semesters after they completed the program.[8]

Background

The Policy Context

As open-entry institutions that are typically more affordable than four-year colleges and universities, community colleges offer great promise to students in the United States. Every year, about 34 percent of the nation's postsecondary enrollees are in community colleges.[9]

[7]See Visher, Schneider, Wathington, and Collado (2010) for an in-depth discussion of the key elements of comprehensive learning communities as identified by the research team: curricular integration, pedagogical strategies that encourage active and collaborative learning, faculty collaboration, student engagement arising from strong relationships among students and between students and faculty, and the integration of student support services.

[8]For more details on the purpose and design of the Learning Communities Demonstration, see Visher, Wathington, Richburg-Hayes, and Schneider (2008).

[9]Knapp, Kelly-Reid, and Ginder (2009).

Unfortunately, as enrollment has increased over time, overall success rates have not kept pace, and only about half the students who enroll in community college with the intention of earning a credential or transferring to a four-year institution meet that goal within six years.[10] This low rate of success is even lower for students in need of developmental education, particularly those who place into developmental math.[11]

According to a recent study of 57 Achieving the Dream colleges, only one-third of students who required developmental coursework in math completed the developmental sequence within three years. [12] This sequence is required before students can enter college-level math, and college math is typically required before students can earn a degree. Interestingly, among the two-thirds of students who did not complete the developmental math sequence, the majority never enrolled in their first or subsequent course. This suggests that failure to enroll in math may be a greater barrier to completing the sequence than failure or withdrawal from courses.[13]

Because so many students never progress past the developmental math level and remain unable to enter even the needed first college-level math course, community colleges and other stakeholders are beginning to suggest and implement a range of new approaches. One genre of programs attempts to accelerate students' progression to college math, either by compressing courses into less time or by putting students directly into college-level courses with extra supports.[14] Another approach questions the developmental math course sequence even more directly, by proposing a different set of math competencies that students should be expected to learn in order to be prepared to pursue their academic and personal goals in college and the modern workplace.[15] A less radical approach is to provide another set of programs that increase support for students in developmental math courses, such as extra advising or tutoring.[16] All of these approaches are designed to increase the number of students who progress successfully through the developmental sequence and, correspondingly, decrease the costs of providing developmental education. There is disagreement about the total cost of developmental education, but some national estimates put it at over $2 billion per year.[17] Learning communities are another popular response to this problem.

[10]Hoachlander, Sikora, and Horn (2003). Also see Weiss, Visher, and Wathington (2010); Visher, Wathington, Richburg-Hayes, and Schneider (2008); and Brock (2010).

[11]Attewell, Lavin, Domina, and Levey (2006).

[12]Bailey, Jeong, and Cho (2009).

[13]Bailey, Jeong, and Cho (2009), pg 10.

[14]Zachry (2008); Adams, Miller, and Roberts (2009); Adams (2003).

[15]Bryck and Treisman (2010).

[16]Scrivener, Sommo, and Collado (2009); Visher, Butcher, and Cerna (2010).

[17]Fulton (2010).

Learning Communities: A Popular Strategy

In learning communities, small groups of students are co-enrolled as a cohort in two or more courses that are often thematically linked and may share curriculum, assignments, and assessments. Learning communities may be particularly promising as a strategy for increasing success rates of community college students, who often spend little time on campus due to competing demands, such as earning a living or caring for family members. Proponents of learning communities believe that linking courses will lead to better outcomes for these students in two ways: first, by strengthening relationships among students and between students and faculty, and second, by changing how material is taught in the classroom by contextualizing the skills and knowledge taught in each course.[18]

Learning communities are a particularly compelling strategy for teaching students in need of developmental education and increasing their ability to move on to college-level coursework.[19] The social integration encouraged by co-enrollment in multiple classes can be extremely important for academically underprepared students, who may be more marginalized from the college community. Moreover, the connection between the developmental-level course and the course with which it is linked — whether a college-level course as at Queensborough or a student success course as at Houston — may serve to bolster learning in each linked course.[20]

Important early research suggested that students in learning communities benefitted both academically and socially in comparison with similar students who did not enroll in learning communities.[21] But these studies left open the question of whether the positive effects were due to the program itself or to differences in the characteristics of the students who chose to enroll in the program (such as their ability, motivation, or tenacity). One way to control for these differences is to randomly assign students to have access to the program or not, thus creating two groups of students that are similar in both observable and unobservable characteristics. Any subsequent substantial differences in educational outcomes can then be attributed, with a high level of confidence, to systematic differences in students' experiences after they were randomly assigned; in this case, the opportunity and encouragement to enroll in a learning community.

MDRC conducted the first random assignment study of learning communities at Kingsborough Community College in Brooklyn, New York, as part of the Opening Doors

[18]See Smith, MacGregor, Matthews, and Gabelnick (2004); Tinto (1997); Minkler (2002).

[19]Boylan (2002); Center for Student Success (2007).

[20]For a more comprehensive review of learning communities practices and their theory of change, see Visher, Schneider, Wathington, and Collado (2010).

[21]Especially Tinto, Goodsell-Love, and Russo (1994); Engstrom and Tinto (2008). For a more comprehensive review of prior research on learning communities, see Visher, Wathington, Richburg-Hayes, and Schneider (2008).

Demonstration.[22] In this study, freshmen were assigned at random to either a program group that had access to the learning communities or to a control group that received the college's standard courses and services. Kingsborough's Opening Doors learning communities enrolled cohorts of roughly 25 program group members into learning communities that linked three classes together: English (usually at the developmental level), a course in another academic subject, and a one-credit college orientation course. Students also received enhanced counseling and a textbook voucher, and faculty received professional development and support not always offered to other faculty on campus.

The findings from this rigorous study showed that the Kingsborough Opening Doors learning communities program had several positive impacts on students. First, students in the program group felt more integrated and engaged in college than students in the control group. Second, the program moved students more quickly through the developmental English sequence. Program group students enrolled in English and passed the end-of-course assessment test at higher rates than their control group counterparts. And third, during their first semester in the study, students in the program passed more courses and earned more credits. However, these effects diminished in subsequent semesters, and Kingsborough's developmental English learning communities had little immediate impact on continued persistence in college.[23] The results from this study and others mentioned above paved the way for the Learning Communities Demonstration, which tested several different models of learning communities at institutions across the country.

Overview of the Learning Communities Demonstration

Six community colleges participated in the Learning Communities Demonstration, the first large-scale, national random assignment evaluation of learning communities. The colleges, listed below, are spread across the country and all serve large numbers of students who are low income and in need of developmental coursework:

- The Community College of Baltimore County (CCBC) (Baltimore, Maryland)
- Hillsborough Community College (Tampa, Florida)
- Houston Community College (Houston, Texas)

[22]Opening Doors was a multisite study that tested interventions at six community colleges designed to help low-income students stay in school and succeed.

For more information, see http://www.mdrc.org/project_31_2.html.

[23]Initially, the program did not have an impact on reenrollment; after two years, slightly more program group than control group members attended college, but it is unclear whether this impact will be sustained over time (Scrivener et al., 2008).

- Kingsborough Community College (Brooklyn, New York)
- Merced College (Merced, California)
- Queensborough Community College (Queens, New York)

The six colleges chose different courses to link and in some cases added features such as enhanced access to student services and other forms of support. Table 1.1 summarizes the core features of each program, as well as its target population. The research team selected programs to represent the broad range of models and links in use in community colleges. The Houston and Hillsborough Community College programs — at the more basic end of the spectrum of possible learning community programs — both linked a student success course with a developmental course (math at Houston and reading at Hillsborough) and at least initially involved minimal expectations of faculty to collaborate or offer integrated curriculum.

At Queensborough, most of the learning communities linked developmental math with a college-level course. The program at CCBC was relatively comprehensive in its model, linking a college-level course with a developmental English or reading course and including a "Master Learner" seminar designed to help students "learn to learn" and work on integrated assignments. Merced College and Kingsborough, which each had long histories of running strong learning communities, encouraged a relatively high level of integration between the linked courses. Merced linked a variety of courses, both college-level and developmental, with a developmental English or reading course. Kingsborough, unlike the other five colleges, targeted continuing and transfer students who had already satisfied their requirements for developmental courses. Like CCBC, Kingsborough linked three courses: two college-level courses in specific majors with a single-credit "integrative seminar" designed to help students see connections between their course work and career goals.[24]

All of the colleges in the demonstration experienced a learning curve as they scaled up their programs to serve more students. During this time, each college worked to strengthen its learning communities, particularly two core components of the model: student cohorts and instructional practices such as curricular integration and collaborative learning. However, there remained significant variation across the learning communities within each college, as some faculty teams were more able to meet their program's expectations than others. In fact, the variation in instructional strategies and strength of program implementation seemed at least as great *within* colleges as *across* colleges.[25]

[24]For a description of each college's learning communities program model, see Visher, Schneider, Wathington, and Collado (2010).

[25]Visher, Schneider, Wathington, and Collado (2010).

Table 1.1

Overview of the Learning Communities in the Learning Communities Demonstration, by College

College	Learning Community Program Model	Eligible Population
Developmental Math as Anchor Course		
Houston Community College (Houston, TX)	• Developmental math linked with a student success course • Student success course focuses on acclimation to college, study skills	• Assessed into lowest level of developmental math • First-time students at Houston
Queensborough Community College (Queens, NY)	• Developmental math linked with developmental or college-level English (fall 2007), or with a college-level course (spring 2008 and beyond)	• Assessed into either of two levels of developmental math • New students and students with less than a semester of credits
Developmental English or Reading as Anchor Course		
The Community College of Baltimore County (Baltimore, MD)	• Developmental English or reading linked with a college-level course (e.g., psychology, sociology, business) • Master Learner Component — a faculty member (sometimes the developmental English instructor) sits in on a college-level course and conducts a weekly, one-hour, noncredit seminar on learning-to-learn in the context of the college-level course	• Assessed into highest level of developmental English or reading
Hillsborough Community College (Tampa, FL)	• Developmental reading linked with a student success course • Student success course focuses on acclimation to college, study skills	• Assessed into either of two levels of developmental reading • First-time students
Merced College (Merced, CA)	• Developmental English linked with developmental reading or math, a college-level course, or a student success course • Several of the links have supplemental instructors — trained peer instructors who facilitate voluntary group study sessions	• Assessed into any of three levels of developmental English
Integrative Seminar as Anchor Course		
Kingsborough Community College (Brooklyn, NY)	• Two linked courses recommended or required for an occupational major • Required attendance in an "integrative seminar," a 1-credit course designed to help students make connections between their linked courses, course content, career plans, and the real world	• In targeted occupational major: business, accounting, allied health, mental health, early childhood education, tourism and hospitality, and liberal arts • Continuing students and transfer students

Between fall 2007 and fall 2009, a total of 6,802 students across the six colleges volunteered to be part of the study and were randomly assigned to either the program group or the control group. Nearly 4,000 of these students were randomly assigned to the program group, where they could enroll in a learning community that fit their schedules and course needs; the rest were assigned to the control group, where they were allowed to enroll in any course for which they were eligible or that was required, but could not enroll in a learning community. A total of 175 learning communities were included in the study.[26] Study sample sizes were sufficient at each college to permit researchers to test for the impacts of the program at each site separately.

Results of impact evaluations at the six colleges are being presented in a series of reports released in 2010 and 2011. The first report examined the impacts of learning communities for students in developmental reading at Hillsborough, where the most salient feature was the co-enrollment of students in the linked developmental reading and student success courses. Curricular integration and faculty collaboration were generally minimal at the start of the study, but increased over time as the faculty participated in professional development and the program coordinator clarified expectations for these elements. Overall (for the full study sample), Hillsborough's learning communities program did not have a meaningful impact on students' academic success. However, corresponding to the maturation of the program over the course of the study, evidence suggests that the program had positive impacts on some educational outcomes for the third cohort of students. For this cohort, during the program semester, students in the program group earned more credits than their control group counterparts. In the following semester, these students registered at a higher rate than their control group counterparts.[27]

This report presents the impacts of learning communities for students in the two demonstration colleges that focused on developmental math: Queensborough and Houston. Subsequent reports will present the impacts of learning communities for continuing students at Kingsborough and the impacts of developmental English learning communities at CCBC and Merced. A final comprehensive report synthesizing and interpreting the results from all six colleges in the Learning Communities Demonstration is scheduled for release in 2012.

What Impacts Can Be Expected from Learning Communities for Students in Developmental Math?

One of the primary expectations for the learning communities at Queensborough and Houston in the short term is that they may accelerate students' progression through develop-

[26]For a description of the methodology of the Learning Communities Demonstration, see Visher, Wathington, Richburg-Hayes, and Schneider (2008).

[27]Weiss, Visher, and Wathington (2010).

mental math and into college-level coursework. Research suggests that prompt enrollment and progress through the required math sequence is an important step toward the longer-term goal of college success.[28] Administrators at Houston, in particular, were focused on this premise, offering learning communities to students who placed into the lowest level of developmental math, with the primary goal of having those students attempt and complete developmental math early in their college tenure.

A longer-term expectation is that the opportunity to enroll in these learning communities will increase students' ultimate likelihood of earning a credential or transferring to a four-year institution. This success is hypothesized to emerge from the progress through developmental coursework, but also from stronger relationships among students and faculty, from changes in how material is taught in the classroom, and from the integration of student support services into learning communities.[29] Administrators at Queensborough generally espoused this vision, hoping that learning communities would provide students with deeper learning and a sense of belonging, which would lead to greater persistence and success at the college.

If these longer-term outcomes are achieved by a learning community program, both students and the college may also benefit financially — an important factor when considering the cost of a program. Reducing the number of semesters a student spends in developmental courses could create savings for both the student and the institution. Additionally, increased persistence could generate additional tuition and state funding for the college, as well as potentially reducing the need for expensive outreach and recruitment. Students who persisted would also be likely to see increased salaries; a number of studies indicate a strong association between earnings and academic achievement, with measurable differences arising from earning a greater number of college credits, as well as a full credential.[30] For example, one study suggests that earning an associate's degree increases gross lifetime earnings of students by over $100,000. Other research suggests that even an increase of one additional credit earned at a community college increases gross lifetime earnings by around $1,400.[31]

At both Houston and Queensborough, administrators and faculty saw the potential for learning communities to meet these short- and longer-term goals, and the Learning Communities Demonstration was designed to determine whether the programs succeeded in these efforts. Specifically, this report examines whether students in the learning communities group moved more quickly through the developmental math sequence than their control group counterparts,

[28]Johnson and Kuennen (2004).

[29]Smith, MacGregor, Matthews, and Gabelnick (2004); Engstrom and Tinto (2008); Visher, Schneider, Wathington, and Collado (2010); Minkler (2002).

[30]See Jepsen, Troske, and Coomes (2008); Kane and Rouse (1995); Marcotte (2009); and Prince and Jenkins (2005).

[31]This figure was derived from MDRC calculations based on Marcotte (2009) estimates.

by looking at students' developmental math attempts and pass rates. This report also takes an early look at whether students in the learning communities group continued to reenroll in college at higher rates than the control group and whether they attempted and earned more cumulative credits — key steps toward a credential or transfer. At Queensborough, student progress is tracked for three semesters (the program semester and two semesters beyond). At Houston, where the study intake period continued a semester beyond that at Queensborough, student progress is tracked for two semesters. Additionally, several subgroups of students at each college are analyzed independently to determine if the programs are more effective for certain groups of students. Finally, the costs of running learning communities at Houston are reported, to understand the resources required to administer the program and to eventually contribute to an analysis of whether the longer-term effects of the program outweigh the costs.[32]

Previous studies of learning communities and other programs with comparable goals provide an indication of the impact that can be expected for developmental students' level of achievement in learning communities. These findings are also a useful reminder of the depth of the issue of academic underpreparation; many successful programs see diminished effects over time, and even the most successful programs fall short of supporting achievement for all of their students. For example, a quasi-experimental study of learning communities for academically underprepared students at 13 community colleges found that 62 percent of students in learning communities reenrolled the following year, compared with 57 percent of comparison group students.[33] As discussed above, MDRC's Opening Doors study at Kingsborough found that students in learning communities moved more quickly through the developmental English sequence, though the impacts were primarily seen in the program semester, and students in the control group generally caught up in later semesters.[34]

Studies of other community college programs designed to boost the success of at-risk students show a similar array of results, though it is important to note that the results are not directly comparable as a result of variations in the programs, the participating students, and the research designs in these studies. For example, a random assignment evaluation of a yearlong performance-based scholarship program for low-income parents in Louisiana showed large and sustained impacts on students' persistence and success; Washington's I-BEST program, which integrates basic skills with college-level career technical skills instruction, has also shown impressive results when student outcomes are compared using statistical controls.[35] More often,

[32]These cost analyses were conducted at Houston only, as a result of the timing and availability of data. Similar cost data for learning communities for developmental English students were collected at The Community College of Baltimore County and will be published in an upcoming report. The analysis comparing longer-term effects and program costs will be published in the final report on the demonstration.

[33]Engstrom and Tinto (2008).

[34]Scrivener et al. (2008).

[35]Richburg-Hayes et al. (2009). Jenkins, Zeidenberg, and Kienzl (2009).

though, studies have found program impacts that are modest but positive, with effects often diminishing after the special program or services end.[36]

Taken together, these studies show that reforms and programs for at-risk community college students can be effective, but that these effects are often relatively modest or short lived. These other studies can serve as an important reminder that a step ahead in students' short-term progress does not necessarily guarantee their long-term success.

Organization of This Report

Chapter 2 of this report describes Queensborough and Houston Community Colleges, the developmental math sequence at each college, the characteristics of the study samples, and the data sources used in this report.

Chapters 3 through 6 are focused on the individual colleges. Chapters 3 and 5 provide overviews of the programs' history and implementation at Queensborough and Houston, respectively. Chapter 5 also provides an overview of the costs of Houston's learning communities over and above the costs of offering standard courses. Chapters 4 and 6 describe the learning communities' effects on various educational outcomes at each college.

Chapter 7 discusses the implications of these findings across the two colleges and offers conclusions and reflections.

[36]Brock (2010).

Chapter 2

The Colleges, the Study Sample, and Data Sources

The Participating Colleges and Their Environments

Queensborough Community College is a midsize college in Queens, New York. Part of the City University of New York (CUNY) system, its campus is nestled among tree-lined streets and cul-de-sacs in the community of Bayside, a suburban area of Queens reminiscent of neighboring Long Island.

With 2.3 million residents, Queens is the second largest borough in New York City in population and the largest in area, covering about 100 square miles. Queens is home to a very diverse population, and the demographic makeup of Queensborough's student body reflects this, as it is almost equal parts African-American, white, Hispanic, and Asian (see Table 2.1)[1] Three-quarters of the students at Queensborough are 24 years old or younger, and just over half attend full time. The study sample is a select subsample of the larger student body because participation in this study was predicated on students meeting the criteria described below; they were primarily new students in need of developmental math. The college serves over 13,000 students. While many students attending Queensborough live in Queens, there are no residency restrictions on enrollment.

As at Queensborough, the learning communities in the study at Houston Community College targeted students in need of developmental math. In many other ways, however, the two institutions and cities differ greatly. Houston is the largest city in Texas and home to 2.3 million residents, making it the fourth largest city in the United States. In terms of its geographic area, Houston is roughly 530 square miles, which is more than five times larger than Queens. The low population density gives Houston a largely suburban feel, though it has more than a few skyscrapers. The city is home to some of the largest South Asian, Nigerian, and Vietnamese communities in the country.

Houston Community College is a large community college system comprised of six colleges located in and around Houston. Like many things in Texas, it's big — the system serves over 40,000 students each year at its six colleges, several of which have multiple campuses. Three of the campuses (Central, Northline, and Southeast) participated in the Learning Communities demonstration. Table 2.1 provides selected characteristics of Houston and its student body. Houston is as diverse as Queensborough, but the student body tends to be older,

[1]Data come from the U.S. Department of Education.

The Learning Communities Demonstration

Table 2.1

Selected Characteristics of Queensborough Community College and Houston Community College

Learning Communities for Students in Developmental Math

	Queensborough	Houston
Institution size	13,359	43,518
Has tenure system	Yes	No
Undergraduate characteristics		
Gender (%)		
Male	43.1	40.7
Female	56.9	59.3
Age		
18-24	75.9	55.7
25-34	14.4	27.7
35 and older	9.7	16.6
Race/ethnicity (%)		
Hispanic	22.0	27.6
White	23.8	20.0
Black	24.2	25.9
Asian	20.4	11.1
Other	9.6	15.4
Enrollments (%)		
Full time	52.1	29.3
Part time	47.9	70.7
Full-time retention rate (%)[a]	70	58
Part-time retention rate (%)	56	46

SOURCE: MDRC calculations using U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS) data from fall 2007.

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

[a] According to IPEDS, this is the percentage of first-time degree/certificate-seeking students from the previous fall who either reenrolled or successfully completed their program by the current fall.

and far more students attend part time. The student population is almost equal parts African-American, white, Hispanic, and Asian. Just over half of all students are 24 or younger, and the majority of students (71 percent) attend only part time. The broad profile of Houston's student body in Table 2.1 may not be an accurate reflection of students in the study, as the learning communities targeted the subset of students who require the lowest level of developmental

math. This may have narrowed the target population more than at Queensborough, where students in need of any level of developmental math could enroll in the study.

Developmental Math at the Colleges

Over 70 percent of first-time, full-time students at Queensborough require remediation in reading, writing, or math.[2] Students at Queensborough who require remediation in math place either into MA 005: Basic Mathematics & Problem Solving (Basic Math) or MA 010: Elementary Algebra.[3] Students who test into the lowest level of developmental math are therefore required to complete two courses before proceeding into college-level math. At Houston, there are three levels of developmental math — Math 0306 (Fundamentals of Mathematics I, or Math I), Math 0308 (Fundamentals of Mathematics II, or Math II), and Math 0312: Intermediate Algebra. Students in the lowest math course at Houston have to pass through a three-course sequence before meeting eligibility for college-level math. For students who test extremely low at Houston, there is a one-unit, self-paced course (Math 0102: Basic Mathematics) that covers basic operations in whole numbers. As seen in Table 2.2, there is substantial overlap between the content of the developmental math sequence at Queensborough and the Math I and II series at Houston.

Placement into these various math courses is determined by the COMPASS, a computer-adaptive college placement test created by ACT and used by colleges to evaluate students' skills in math, among other areas. The math section of the COMPASS used at these schools consists of both a pre-algebra portion and an algebra portion, and students are assigned a separate score for each portion. These scores are then used to determine which math course is most suited to students' skill levels. While both the CUNY system and the state of Texas have minimum placement score requirements for students to test out of developmental math and into a college-level course, individual schools have discretion to require their students to earn higher scores in order to be eligible for college-level coursework.

One key difference between developmental math at Queensborough and Houston is in these placement test "cut scores." Both colleges administer the COMPASS to determine math placement for their incoming students. However, Houston's administration has set its minimum placement score for college-level math decidedly higher than Queensborough's. As shown in

[2]Queensborough Community College (2010).

[3]Students with stronger backgrounds in algebra can test into MA 013, a slightly accelerated version of MA 010.

Table 2.2

Developmental Math Course Content

Learning Communities for Students in Developmental Math

	Queensborough		Houston	
Content Area	MA 005: Basic Mathematics and Problem Solving (Basic Math)	MA 010: Elementary Algebra	MATH 306: Fundamentals of Mathematics I (Math I)	MATH 308: Fundamentals of Mathematics II (Math II)
Whole Numbers	✓		✓	
Introduction to Integers	✓		✓	
Introduction to Algebraic Expressions		✓	✓	
Multiplying and Dividing Fractions	✓		✓	
Adding and Subtracting Fractions	✓		✓	
Decimal Notation	✓		✓	
Ratio and Proportion	✓		✓	
Percentages	✓		✓	
Data, Graphs, and Statistics			✓	
Geometry	✓			✓
Real Numbers		✓		✓
Solving Equations and Inequalities		✓		✓
Graphing and Functions		✓		✓
Systems of Equations		✓		
Exponents		✓		✓
Polynomials		✓		✓
Factoring		✓		✓
Rational Expressions and Equations		✓		✓
Radical Expressions and Equations		✓		✓

SOURCE: Queensborough Community College and Houston Community College course catalogs and syllabi, MDRC Field Research.

Table 2.3, students at Queensborough must receive a score of 30 or higher[4] on only the pre-algebra portion of the COMPASS in order to place into Elementary Algebra (the second level of developmental math) and a 30 on the pre-algebra portion and a 38 on the algebra portion to be eligible to take College Algebra and Trigonometry — the first college credit-bearing course in the Queensborough math sequence.

Students at Houston, on the other hand, must earn either a 49 on the pre-algebra portion of the COMPASS or a 39 on the algebra portion to place into Math II (the second level of developmental math at Houston). In order to place into College Algebra and gain college-level credit, they must earn a 71 or better on the algebra portion of the test. This difference in cut scores between Queensborough and Houston means that two students who earn the same score on the COMPASS placement test could end up in different math levels, depending on the college they attend. For example, a score of 35 on the pre-algebra portion of the COMPASS qualifies a student for Elementary Algebra at Queensborough, but only for Math I at Houston. As indicated in Table 2.2, the Queensborough student would start math in a course that covers more advanced material than a Houston student with the same score. In an even more striking example, a score of 40 on the algebra portion of the COMPASS exam qualifies a student for College Algebra at Queensborough, but still only for the lowest-level developmental math course at Houston.

Recruiting and Enrolling Students in the Study

Students had to meet *all* of the following eligibility criteria to be eligible to participate in the learning communities study at the two colleges:

- First-year student status (At Queensborough, returning students who have failed developmental math and transfer students who have earned fewer than 15 credits were eligible for the study as well.)
- Placed into developmental math
    - At Queensborough, this applied to all students in need of developmental math, including Basic Mathematics and Problem Solving (Math 005) or Elementary Algebra (Math 010).
    - At Houston, this applied to students in the lowest levels of developmental math; primarily Fundamentals of Mathematics I (Math 0306), or a small number of students at Fundamentals of Mathematics II (Math 0308).

[4]Before the spring 2008 term, it was a 28.

The Learning Communities Demonstration

Table 2.3

Developmental Math Courses and Placement Scores
Learning Communities for Students in Developmental Math

Queensborough Community College Developmental Math Sequence	COMPASS Score[a]	Houston Community College Developmental Math Sequence
MA-005: Basic Mathematics and Problem-Solving (Basic Math) Pre-algebra score range: below 30[c]	**1** ↓	*MATH 0102: Basic Mathematics*[b]
MA-010/MA-013: Elementary Algebra Pre-algebra score range: 30+[d] AND Algebra score range: below 30[e]	↓	**MATH 0306: Fundamentals of Mathematics I (Math I)** Pre-algebra score range: 18-48 OR Algebra score range: 1-38
MA-114: College Algebra and Trigonometry for Technical Students *MA-120: College Algebra and Trigonometry* *Pre-algebra score range: 30*[d] *AND* *Algebra score range: 38+*	↓ ↓ **100**	*MATH 0308: Fundamentals of Mathematics II (Math II)* *Pre-algebra score range: 49+* *OR* *Algebra score range: 39-48*[f] *MATH 0312: Intermediate Algebra* *Algebra score range: 49-70* *Math 1314: College Algebra* *Math 1332: Mathematics for Liberal Arts* *Algebra score range: 71-100*

(continued)

Table 2.3 (continued)

SOURCE: Houston Community College and Queensborough Community College course catalogues, syllabi, and placement policies.

NOTES: [a]At Houston, placement determined by whichever test provides the higher placement. At QCC, students must meet the minimum score on both tests to be placed into a given level.

[b]At Houston, students who score below 18 on the pre-algebra COMPASS test are placed into MATH 0102: Basic Mathematics, which is a one-unit, self-paced course and covers basic operations in whole numbers.

[c]Before 2008: below 26.

[d]Before 2008: 27 or higher.

[e]At Queensborough, students who score below 30 on the COMPASS algebra test are placed into MA-010. Students who score between 30 and 37 on the COMPASS algebra test are placed into MA-013, which covers the same material as MA-010 in fewer credit hours.

[f]Or 1-50 on the college algebra COMPASS placement exam.

At QCC, students also have the option of taking MA-114: College Algebra and Trigonometry for Technical Students. The content of MA-114 is similar to MA-120, and students can only receive credit for one or the other.

At Houston, students have the option of taking MATH 1332: Mathematics for Liberal Arts. MATH 1332 is an alternative to MATH 1314 designed for nonmath, nonscience and nonbusiness majors.

- Available to take the learning community classes at their scheduled times.

At Queensborough, a total of 1,034 students were enrolled in the study between May 2007 and January 2009. Cohorts of program group students participated in learning communities during four semesters: fall 2007, spring 2008, fall 2008, and spring 2009. At Houston, enrollment in the study was carried out between November 2007 and September 2009. During this time, a total of 1,273 students were enrolled. Cohorts of program group students participated in learning communities during four semesters: spring 2008, fall 2008, spring 2009, and fall 2009.

Characteristics of the Sample

Table 2.4 presents selected characteristics of the students enrolled in the learning communities study at Queensborough and Houston at the time of random assignment. The first column shows descriptive data about the types of students who participated in the study at Queensborough; the second column shows data for the students who participated in the study at Houston. It is important to note that the study sample should not be considered representative of the broader student bodies at Queensborough and Houston shown in Table 2.1. The study sample tends to be more at risk than the student body overall, as evidenced by their level of developmental need and the predominance of students of color in the sample. The majority of study participants at both colleges are women (56.0 percent and 66.7 percent, respectively),

The Learning Communities Demonstration

Table 2.4

Characteristics of Sample Members at Baseline

Learning Communities for Students in Developmental Math

	Queensborough	Houston
Gender (%)		
Male	44.0	33.3
Female	56.0	66.7
Age (%)		
17 - 20 years old	78.1	62.9
21 - 25 years old	15.1	18.4
26 - 30 years old	3.2	8.8
31 and older	3.6	9.9
Race/ethnicity[a] (%)		
Hispanic	32.8	54.7
White	13.7	3.1
Black	30.6	34.5
Asian or Pacific Islander	11.8	0.8
Other[b]	5.2	0.8
Missing	5.9	6.2
Marital status (%)		
Married	4.5	8.9
Unmarried, living with partner	10.3	14.3
Unmarried, not living with partner	60.7	57.9
Missing	24.4	18.9
Has one or more children (%)	7.4	28.3
Missing	2.7	6.5
Financially dependent on parents (%)	37.0	29.1
Missing	29.5	18.0
Currently employed (%)	40.3	40.5
Missing	16.2	11.3
Highest grade completed (%)		
9th grade or lower	3.3	3.7
10th grade	4.4	3.0
11th grade	7.5	5.3
12th grade	78.4	80.8
Missing	6.4	7.2

(continued)

Table 2.4 (continued)

	Queensborough	Houston
Diplomas/degrees earned[c] (%)		
High school diploma	75.8	78.3
GED	16.8	11.8
Occupational/technical certificate	2.7	5.6
None of the above	2.4	2.5
Missing	5.6	7.1
Date of high school graduation/GED receipt (%)		
During the past year	61.3	46.3
Between one and five years ago	22.4	24.2
More than five years ago	6.6	19.7
Missing	9.7	9.9
Taken any college courses (%)	21.4	12.1
Missing	4.5	6.6
First person in family to attend college (%)	24.6	40.2
Missing	7.7	8.2
Own or have access to a working car (%)	37.2	65.4
Missing	4.9	7.2
Language other than English spoken regularly in home (%)	38.7	46.3
Missing	2.9	6.1
COMPASS placement test score at baseline		
Pre-algebra	32.4	32.8
Algebra	20.3	20.9
Sample size	1,034	1,273

SOURCE: MDRC calculations using Baseline Information Form data and Queensborough and Houston placement test data.

NOTES: Calculations for this table used all available data for the 1,034 sample members who were in the fall 2007, spring 2008, fall 2008, and spring 2009 cohorts at Queensborough Community College; and the 1,273 sample members who were in the spring 2008, fall 2008, spring 2009, and fall 2009 cohorts at Houston Community College.

The probability of being assigned to the treatment group varies within cohorts, and estimates are weighted to account for the different random assignment ratios.

Missing values are only included in variable distributions for characteristics with more than 5 percent of the sample missing. Missing values include students who are missing a Baseline Information Form and students who declined to answer a particular question.

Rounding may cause slight discrepancies in sums and differences.

[a]Respondents who said they are Hispanic and chose a race are included only in the Hispanic category. Respondents who said they are not Hispanic and chose more than one race are considered multiracial and are only included in the Other category.

[b]Other includes multiracial, Native American/Alaskan Native, and other race/ethnicities.

[c]Distributions may not add to 100 percent because categories are not mutually exclusive.

which is consistent with both the larger student bodies at Queensborough and Houston as well demographic trends at community colleges nationwide. About 78 percent of study participants at Queensborough were between the ages of 17 and 20, traditional college age, at the time they enrolled in the study. Students at Houston were somewhat older in general, though the majority of students (62.9 percent) were between the ages of 17 and 20 as well.

At both Queensborough and Houston, black and Hispanic students are overrepresented in the study sample compared with the colleges' student bodies overall; this disparity is more pronounced at Houston than at Queensborough. At Houston, the majority of students in the sample are Hispanic (54.7 percent); 34.5 percent are black and most of the rest (3.1 percent) are white. The study sample at Queensborough is racially diverse, with no racial majority — 32.8 percent of sample members are Hispanic, 30.6 percent are black, 13.7 percent are white, and 11.8 percent are Asian or Pacific Islander.

At the time of random assignment, when the baseline form was completed, only a small portion of sample members at Queensborough had children (7.4 percent had at least one child). There were more parents in the study sample at Houston, but the number was still relatively low (28.3 percent). The vast majority (about 80 percent) of sample members had earned a high school diploma, and about 40 percent of the sample members at both Queensborough and Houston reported being currently employed.

Students at the two schools entered the learning communities demonstration having performed very similarly on the two relevant portions of the placement test. Students' scores on the pre-algebra portion of the COMPASS exam at the two institutions were virtually indistinguishable. The average score at Queensborough was 32.4, with a standard deviation of 13.8; at Houston, the average score was 32.8, with a standard deviation of 13.0. At Queensborough, the average score on the algebra portion of the COMPASS test was 20.3, with a standard deviation of 4.6; at Houston, the average score was 20.9, with a standard deviation of 6.5.

A Note on the Random Assignment Design

As mentioned in Chapter 1, random assignment creates two groups of students that are similar in characteristics that can be measured, such as age and gender, and those that are more difficult to measure, such as motivation and tenacity.[5] Any subsequent substantial differences in outcomes can be attributed, with a high level of confidence, to systematic differences in

[5]The two groups should be similar in terms of averages as well as other distributional characteristics. Analyses of the program and control group characteristics at Queensborough and Houston (not shown) demonstrated that random assignment was conducted successfully at both schools, leading to research groups that were very similar when the program began.

students' experiences *after* they were randomly assigned; in this case, the opportunity to participate in a developmental math learning community.

Random assignment allows researchers to calculate unbiased estimates of the *value added* by the program, above and beyond what students normally receive at the college. It is important to remember that the impacts reported are the *magnitude of additional outcomes*, above and beyond what students would achieve independent of the program.[6]

A random assignment evaluation is an extremely reliable way to test a program's overall effectiveness, though it has its limitations, like any research method. Like many evaluation designs, random assignment does not typically make it possible to disentangle the effects of one program component from another. For the Houston learning communities program, for example, this study will determine whether the *entire package* was effective. This package included the linking of two classes (creating cohorts of students), the college success course (focusing on acclimation to college life and study skills), certain instructional strategies (such as integration of material across the two courses), and the qualities of teachers who taught in the learning communities.[7] The qualitative research conducted as part of this study can provide information about which components of this program package mattered most to the program's leaders and the faculty and students who participated in the learning communities. However, it cannot definitively determine which of these components mattered most for student outcomes such as passing courses and persistence to the next semester.

Data Sources and Follow-Up Periods

Impact Data

Immediately before being randomly assigned to the research groups at Queensborough and Houston, students completed a short questionnaire called the Baseline Information Form (BIF). The BIF collected much of the demographic and other background information reported above, as well as data on additional measures. Baseline data are used to describe the sample and to assess the success of random assignment in creating research groups that are statistically indistinguishable at the start of the study.

[6]See Box 4.1 for a discussion of how to interpret the impact tables in this report.

[7]Teachers were not randomly assigned to teach in the learning community's classes or the control group classes. As a result, program impacts (positive, negative, or not statistically significant) may be influenced by teacher effects. Notably, some program group teachers may also have taught unlinked versions of their courses, courses that were available to control group students, thus partially mitigating concerns regarding teacher effects.

Queensborough and Houston provided transcript and assessment test data for students (both program and control groups) participating in the study. These data are used to provide a detailed look at sample members' performance in college according to various measures, such as enrollment status, credits attempted and earned, and progression through the developmental math sequence. This report presents a range of transcript data outcomes for the first semester that each sample member was in the study (called the "program semester") and the following semesters (called "postprogram semesters"). For students at Queensborough, this yields a three-semester follow-up period. Because the Learning Communities study at Houston ended a semester after Queensborough's, there is a two-semester follow-up period for the students who participated at Houston. Table 2.5 displays the timing of the program and postprogram se-mesters for the cohorts of students in this study. The transcript data are used in Chapters 4 and 6 of this report to describe the impacts of the learning communities program on education outcomes.

Implementation Data

NCPR researchers visited the Queensborough and Houston campuses periodically and learned a great deal about the learning communities programs each college operated. Two-day field research visits were conducted at each of the colleges in fall 2008. The research teams made follow-up visits to Queensborough in spring 2009 and to Houston in fall 2009. During these trips, the research team interviewed many college administrators, faculty, and staff, most of whom were involved in the learning communities programs. The interviews provided information about the programs and key differences between the programs and the colleges' standard services (what the control groups were offered). The research team also interviewed a small subset of program and control group students to gain a deeper understanding of their experiences at the college and, for program group students, in the learning communities. During these visits, the research team observed some learning community classes at Houston, but not at Queensborough. In addition, the research team maintained regular communication with key staff at both sites throughout the study.

Research staff involved in the operational site visits maintained detailed "site diaries," which documented information on study intake and the random assignment process, the process of setting up and staffing the learning communities, and professional development activities. Changes in the learning communities programs were documented as well, along with problems encountered and solutions applied by the colleges.

In addition, a faculty survey was administered to document the characteristics and pedagogical beliefs and practices of faculty. The survey was administered to all learning communities faculty as well as to all faculty who taught in stand-alone versions of those courses that were linked in the learning communities (that is, faculty who may have taught control group students if they signed up for any of the courses included in the learning communities).

The Learning Communities Demonstration

Table 2.5

Semesters of Enrollment in the Learning Communities Study

Learning Communities for Students in Developmental Math

Queensborough Community College

	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010
Cohort 1 (Fall 2007)	Program Semester	1st Postprogram Semester	2nd Postprogram Semester			
Cohort 2 (Spring 2008)		Program Semester	1st Postprogram Semester	2nd Postprogram Semester		
Cohort 3 (Fall 2008)			Program Semester	1st Postprogram Semester	2nd Postprogram Semester	
Cohort 4 (Spring 2009)				Program Semester	1st Postprogram Semester	2nd Postprogram Semester

Houston Community College

	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010
Cohort 1 (Spring 2008)		Program Semester	1st Postprogram Semester			
Cohort 2 (Fall 2008)			Program Semester	1st Postprogram Semester		
Cohort 3 (Spring 2009)				Program Semester	1st Postprogram Semester	
Cohort 4 (Fall 2009)					Program Semester	1st Postprogram Semester

Survey questions were designed to capture instructional strategies commonly associated with learning communities, participation in professional development opportunities, and characteristics of teachers that might be associated with differences in teaching approaches, such as age, gender, seniority, and part-time versus full-time status.[8]

Faculty syllabi from the learning communities linked courses were examined to look for evidence of practices commonly associated with learning communities, such as joint assignments, team teaching, and combined curriculum.[9]

Finally, a cost study was conducted in fall 2009 at Houston, in order to understand the costs of administering learning communities. Cost data were collected through several different means: coordinator interviews, program expenditure reports, and a short student survey. Instructors who taught learning communities courses administered the survey to about 100 students in both their learning communities and non-learning communities sections. It is important to note that the survey did not target control group students, but rather students who were taking stand-alone versions of the learning community courses. These students were used as a comparison group for the survey.

These data sources are used primarily in Chapters 3 and 5 of this report to describe the learning communities programs, to illustrate how they were different from each college's standard services, and to describe the evolution of the programs over time. Chapter 5 includes a discussion of the cost of running learning communities at Houston.

[8]The faculty survey at Queensborough had an overall response rate of 55 percent. At Houston Community College, the response rate was 75 percent. A disproportionately high percentage of program group faculty members responded compared with comparison group faculty members at both schools. For more detail on the faculty survey, see Visher, Schneider, Wathington, and Collado (2010).

[9]For more detail on the syllabi analysis see Visher, Schneider, Wathington, and Collado (2010).

Chapter 3

The Learning Communities Program at Queensborough Community College

The attractiveness of Queensborough Community College's single campus, where trees and outdoor sculptures surround a few 1970s-style buildings, may come as a surprise to a visitor expecting a gritty, urban community college. The ethnic and racial diversity of the student body, however, is an accurate reflection of the global metropolis where one of the City University of New York's smallest campuses makes its home — the college enrolls a nearly equal number of black, Asian, white, and Hispanic students. The college also reports that close to half its students were born in another country, and 47 percent speak a language other than English at home.[1] Among the students who participated in focus groups for this study, there was indeed a mix of U.S.-born students and immigrants with different skin tones, accents, and clothing styles. What they all shared in common was that their scores on the college's entrance exam had deemed them unready for college-level math.

To serve these academically underprepared students, Queensborough created learning communities that each paired one of the college's two levels of developmental math with another course: developmental or college-level English courses for students in the first semester of the demonstration and a variety of college-level courses for students in subsequent semesters. In addition to restructuring the links after the first semester, administrators also scaled up the program to serve more students and made efforts to provide more training and guidance for faculty to enhance the program. This caused the learning communities to strengthen over time, as reflected in the key findings of the implementation research:

- **The college designed and implemented a basic learning community model; greater evidence of the elements of more comprehensive learning communities appeared later in the demonstration.** Curricular integration, faculty collaboration, and connections to support services increased over time, as a result of professional development opportunities, clearer expectations from the coordinator, and growing faculty buy-in.

- **There was a high level of variation in the learning communities within this trend of improvement.** The greatest contrast was between the first and subsequent semesters, as the courses linked with math changed to include only college-level classes. Within each semester, variation occurred as expe-

[1] http://www.qcc.cuny.edu/Welcome.asp

rienced learning community faculty tended to include more curricular integration strategies than newer faculty.

- **As part of the learning community, students in the program group were more likely to attempt developmental math in their first semester.** Program group students were given the opportunity to enroll in the learning community, whereas control group students chose their own courses; however, advisers assisted both program and control group students with registration and told them that the math course was required in order to progress to college-level math.

This chapter uses data collected from focus groups, interviews, and a faculty survey to find patterns across the courses and to get a general sense of the experiences of students and faculty who participated in them, as well as those who enrolled in or taught unlinked versions of the same courses. The following describes the learning communities program model and how that model changed over time, as well as the enrollment process, faculty development for instructors in the program, and a contrast of experiences between students who participated in learning communities and those who did not.

The Program Model: A "Basic" Model for Students at Both Levels of Developmental Math

Queensborough had been running learning communities since 2000, but the program did not focus on students with developmental needs until the college entered the demonstration in 2007.[2] College leaders initiated the program because they thought that new students in need of developmental education could achieve higher success rates in learning communities than in traditional stand-alone courses. This theory of change was based on the premise that first-semester students who enroll in learning communities may become better acquainted with their professors, contribute more to class discussions, and attend class more regularly than their counterparts who do not enroll in learning communities. The decision to include developmental math in the learning community program was made to serve the largest numbers of students; of the placement exams administered at Queensborough, the math placement test has the lowest success rates. As a vice president stated, "We tried different pairings of basic skills classes but math is a big problem here." The college's president believed that cohort-based education strategies had the potential to improve learning for all students. In particular, for students who were deemed unready for college-level math, he said, "Learning communities give them a sense

[2]See Visher, Schneider, Wathington, and Collado (2010) for a more detailed discussion of the history of learning communities at Queensborough.

of belonging because they come here discouraged. They failed the math test, which is a blow to their confidence."

The learning communities in the demonstration at Queensborough were designed for students at both levels of developmental math offered by the college: Basic Mathematics and Problem Solving (MA-005, two levels below the first college-level class) and Elementary Algebra (MA-010, one level below).[3] During the first semester of the study (fall 2007), each of these math classes was linked with either developmental English or college-level English. This course structure attracted fewer students than program administrators had hoped, in part because students resisted filling their course schedule with developmental-level courses. In order to better match students' needs and interests and thus increase the number of students in the links and in the study, the decision was made to link developmental math with various college-level courses for the remainder of the study. (Figure 3.1 provides a visual aid for comparing the learning community structures between the first and subsequent semesters). In addition to the link with college-level English, the other offerings of developmental math were linked with other college-level introductory courses without prerequisites, such as Speech, Business, and Sociology.

The new course structure gave students the opportunity to move up in the developmental math sequence, while simultaneously allowing them to earn college credits. The wider choices for students led to increased enrollment levels in the learning communities, both because more students were interested in the opportunity to earn college credits immediately and because the pool of eligible students was larger as a result of eliminating developmental English from the links. As one administrator said, "Initially, the learning communities did not have a clear focus, and when the linked courses enlisted a clear focus, the learning communities took off!"

How Did Students Get into the Learning Communities?

Throughout the demonstration period, new students were identified as eligible for the learning communities based on their scores on the placement exams they took after applying to the college. During the first semester of the program, students' scores on the math and the English exams were examined to determine eligibility for the program; in subsequent semesters, students' math placement was the only consideration. In addition to this programmatic change, administrators made other changes to the eligibility criteria in order to expand the number of students for the next three semesters. Continuing students who had earned 15 credits or less became eligible and were identified after having failed the Basic Math or Elementary Algebra

[3]See Tables 2.2 and 2.3 for details on the topics covered in each math course, as well as the placement scores required to enroll in each class. Placement test scores also have a role in each course's grading policy; to move onto the next level of math, students are required to earn an average of 70 and to pass the corresponding section of the COMPASS exam.

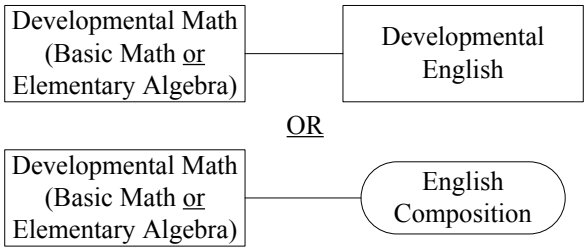
The Learning Communities Demonstration

Figure 3.1

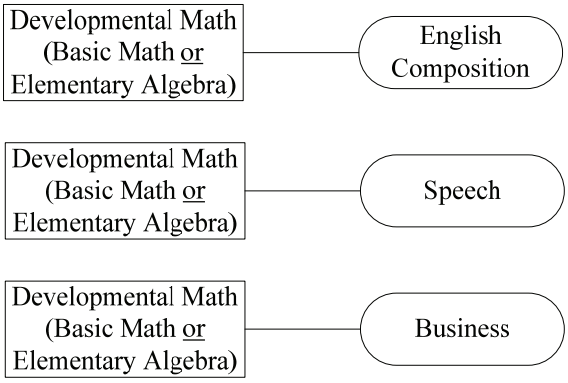
Queensborough: Learning Community Structures, Change over Time (Semester 1 versus Semesters 2-4)

Learning Communities for Students in Developmental Math

Semester 1: Learning Community Structures Offered
Developmental math linked with developmental or college-level English



Semesters 2-4: Examples of Learning Community Structures Offered
Developmental math linked with a variety of college-level courses



course.[4] The age requirement of 18 used during the first semester was lowered to 17 for subsequent semesters. Evening students were excluded by default, because for the most part the classes were scheduled back to back during the day.[5]

From the second semester on, the coordinator and the director of advising cooperated to ensure that advisers who met with students after testing would give eligible students a flyer about learning communities and the research study. Interested students were directed to the Advising office, where they were told about the opportunity to be a part of the study and that their participation was voluntary. Interested students were shown a schedule of the learning community courses, complete with days and times, and were asked to confirm that their personal schedule would accommodate participation in at least one learning community before agreeing to participate in the study. Advisers described learning communities as smaller classes with about 25 students who would take a developmental math class and an entry-level, credit-bearing course with the same group of students. Advisers also informed eligible students that the teachers of the courses in the links might try to collaborate and plan lessons and assignments together. Some of the links included themes to give students an idea of how faculty might link material from both classes, but it depended on the faculty to actually implement these themes.

College staff explained to students their rights and responsibilities if they chose to participate in the study and discussed any questions or concerns before students signed an informed consent form to indicate they understood that their participation was voluntary and their confidentiality would be protected. Students were then asked to complete a brief questionnaire about their background characteristics (the results of this survey are in Table 2.4). Finally, a computer program created by the research team was used to randomly assign students to either a program group, whose members were told they could enroll in a learning community, or to a control group, whose members were advised that they had to enroll in one of the developmental math classes as a prerequisite for college-level courses. Note that although students were advised that these courses were required in order to progress to college-level math, students were not mandated to register for either course at the time of random assignment. College staff assisted students from both groups with registration for all of their courses, and all students were given a bookstore gift certificate to compensate them for the time they spent during the intake process.

This process was used during enrollment periods for the second, third, and fourth semesters of the program. By cooperating with the advising department, the coordinator was more easily able to identify eligible students and give them an opportunity to participate, compared with the first semester. Some eligible students decided not to participate, and some may not

[4]Transfer students with fewer than 15 credits and who placed into developmental math also became eligible for the program.

[5]There was one evening link offered during fall 2008.

have learned about the study during peak registration times. The advisers at Queensborough worked hard to randomly assign a total of 1,034 students across four semesters, and as a result, the research team felt confident that these students were representative of the developmental math population of the college.

How Comprehensive Were the Learning Communities at Queensborough?

In the literature, comprehensive learning communities have several key components designed to create an enhanced teaching and learning environment.[6] Faculty teaching partners are described as communicating regularly about their course content, timing, and shared students; these faculty members also collaborate to develop lessons and assignments to reinforce learning in both courses, an instructional strategy known curricular integration. Connections to student support services available on campus are also an element of comprehensive learning communities, included to ensure that participating students have the resources they need to meet their academic and personal goals.

Comparatively, the learning community model at Queensborough was on the basic end of the spectrum; this was particularly true during the first semester of the program, when co-enrollment was the primary feature of the learning communities. From the second semester on, committed leaders from academic affairs and student support services worked with the program coordinator, department chairs, and full-time faculty members to design and implement a slightly more comprehensive learning community model.[7] This model included a common theme linking the courses in the learning community, which would be supported by joint assignments, a key strategy of curricular integration. Additionally, the program coordinator worked with faculty to include information in the classes themselves about student support services. College leaders believed that these elements would improve students' engagement in the linked courses and lead to better academic performance.

---

[6]Visher, Schneider, Wathington, and Collado (2010).

[7]Another key difference between the first and subsequent semesters of the demonstration was the leadership structure for the program, which was in flux during fall 2007. The previous semester had seen a high level of administrative turnover among leaders who had worked with NCPR to organize recruitment for the study and the learning communities. The program coordinator had left and been replaced, and the replacement resigned during the first semester of the demonstration. It was not until the second semester of the demonstration that the coordinator was hired who would go on to be responsible for overseeing the program during the following two years. As noted in a previous report, committed leaders were essential to managing and scaling up learning communities at all of the colleges in the demonstration (Visher, Schneider, Wathington, and Collado, 2010). These leaders were not truly in place at Queensborough until at least the second semester of the demonstration.

From spring 2008 through spring 2009, more professional development activities were made available to Queensborough faculty to support the implementation of this model. As a result, the program exhibited growing evidence of these elements of more comprehensive learning communities. However, there was a wide amount of variation across the program, as is described in more detail below.[8]

Faculty Collaboration

The level of faculty collaboration varied among teaching pairs, primarily as a result of faculty turnover in the program. In responses to the faculty survey, learning community faculty said it was very important to communicate with other instructors about shared students. All of the learning community faculty (25 survey respondents) reported that they discussed teaching practices with other faculty at the institution, with almost one-half (12 of 25) having such conversations more than five times a semester. However, in focus groups, it appeared to be more difficult to collaborate for instructors who were new to learning communities or who had some experience but were paired with a new instructor. The few pairs who were able to teach together for multiple semesters were better able to refine their collaborative efforts. For example, a Speech faculty member said that when she collaborated with the same instructor of Basic Math for several semesters, she and her partner communicated regularly about their common goals. In an interview she said, "We go over rosters, talk about our students, their grades, and their classroom behavior."

During the second semester of the program, an expert learning community practitioner from the Washington Center for Improving the Quality of Undergraduate Education at Evergreen State College visited Queensborough to observe classes, meet with the coordinator and many learning communities instructors, and provide feedback (see Table 3.1 for more information about faculty development activities at Queensborough during the demonstration). One of the consultant's recommendations for improving collaboration was to organize a postsemester meeting with the learning community faculty. This discussion, scheduled for the last days of the semester, provided an opportunity for faculty who taught that semester to exchange information with instructors who would be teaching in a link for the first time the following semester.

[8]A final component of comprehensive learning communities — student engagement, arising from the relationships that co-enrolled students develop with each other and with their shared faculty members — is discussed in the following section in terms of how this experience differs from that of students in stand-alone courses. Pedagogies that encourage active and collaborative learning are a second instructional strategy considered to be a hallmark of learning communities; this element is not discussed in this chapter because the implementation research conducted at Queensborough provided limited evidence about the existence of these strategies in learning communities and in stand-alone courses.

Table 3.1

Queensborough Faculty Development Activities

Learning Communities for Students in Developmental Math

Summer 2007	Fall 2007	Spring 2008	Summer 2008	Fall 2008	Spring 2009
Faculty and coordinator attend Washington Center Summer Institute	Queensborough English instructor leads discussion among new learning communities instructors, introduces curricular integration strategies	Washington Center consultant observes learning community classrooms, meets with instructors, and provides feedback	New faculty attend Kingsborough Community College Summer Learning Communities Institute	Second in-house professional development event led by English instructor	Third in-house professional development event led by English instructor
	Kingsborough staff offer 3-hour learning communities faculty development training session	Queensborough English instructor leads in-house professional development event at end of semester			

SOURCE: MDRC field research.

Curricular Integration

Not unlike the other colleges in the demonstration, the program coordinator and instructors at Queensborough were able to focus more on improving teaching practices specific to learning communities as program start-up and administrative challenges were resolved.[9] Beginning in the second semester of the demonstration, more faculty began to cooperate and take advantage of support from the coordinator, who provided information about curricular integration strategies and facilitated trainings and discussions between faculty members about this topic. The coordinator and faculty members reported that the professional development events that took place throughout the demonstration were central to the inclusion of curricular integration strategies in the learning communities. Almost all of the learning community faculty who responded to the faculty survey (19 of 25) participated in professional development activities in 2007-2008.

During the first semester of the demonstration, very few faculty had been given the opportunity for professional development related to learning communities or had experience teaching in them. As a result, administrators at the college and faculty who taught in the learning communities described their experience as very "pilot-like." Two faculty members (from math and English), the program coordinator, and her supervisor, the coordinator of Queensborough's Undergraduate Education Initiative, had learned about the importance of curricular integration and what ideal comprehensive learning communities were supposed to look like while attending the National Summer Institute on Learning Communities at Evergreen State College, coordinated by the Washington Center.[10] Social and academic integration was the focus of the institute, and faculty also learned about and discussed collaboration between instructors and between students, instructional strategies to promote active learning, and how to assess student work for evidence of integrated learning. The coordinator commented on the effectiveness of Evergreen for her and for Queensborough's faculty who attended, "Evergreen really changed the way [Queensborough] folks thought about learning communities.…They got us to focus, share with each other and spend time thinking about this. We really learned some great strategies."

Similarly, the English instructor said about his experience: "My fantasy would be that everyone starting out spend three days with their partner at Evergreen." The two instructors went on to teach a learning community together for the following three semesters, and each became an avid supporter of the teaching strategy and an advocate for the program. They encouraged other faculty to cooperate with and take advantage of the ways in which the

[9]See Visher, Schneider, Wathington, and Collado (2010) for more details.

[10]This opportunity was made available to all of the colleges in the demonstration; faculty administrators from the other five colleges also attended during summer 2007 or the following summer.

learning community coordinator could support their collaborative efforts.[11] As the chair of the math department for a period during the demonstration, the math instructor went on to recruit other basic skills math instructors to teach in the links. Additionally, the English instructor became the college's in-house learning community faculty trainer and worked with the coordinator to organize workshops and meetings for faculty. In these workshops, faculty were given the opportunity to discuss the successes and challenges of teaching in learning communities; for example, during the early meetings, math instructors raised concerns about changing their curriculum to include more joint assignments. They said their classes follow a very tight schedule in order to cover all the necessary material to prepare students for retaking the math placement test.

With time, lessons about curricular integration strategies were spread to many faculty who did not attend Evergreen, as the faculty trainer replicated some of the activities he learned at Evergreen for faculty who were not able to attend the institute. Additionally, the coordinator helped faculty attend other external professional development events, and experts visited the college to help more faculty each semester create joint assignments and collaborate more with their partners. During most of the demonstration, the focus of the on-site faculty development events was on the basic concept of learning community pedagogy and discussions about issues faced by faculty who were new to learning communities.

By the final semester of the demonstration, however, greater numbers of faculty had experience teaching in learning communities, and the focus of the workshop was to help faculty further develop integrative assignments that counted toward the course grade in both classes. The faculty trainer and his partner, who taught Elementary Algebra, shared some of their assignments that drew on material from both courses and were based on the theme of their learning community, "The Man Who Counted: A Collection of Mathematical Adventures." According to the Evergreen experts, these types of assignments are helpful in developing academic skills because they allow students to draw connections between the academic material of the courses and their personal experiences.

One example of an integrative assignment from this learning community was based on Barbara Ehrenreich's *Nickel and Dimed: On (Not) Getting By in America,* in which the author takes low-wage jobs in different cities across the country. Students had writing assignments based on this book in the English class and calculated the author's rent and other expenses using algebra in their math class. The trainer pointed out a lesson he and his partner learned at the Washington Center as a basis for this idea: "When you translate math problems into money

[11]At most of the colleges in the demonstration, the coordinator's roles in the administrative structures and their specific responsibilities were not as clear in the first semester of the demonstration as they would become over time (Visher, Schneider, Wathington, and Collado, 2010, p. 35.)

problems, students understand it better." The coordinator commented, "This is a wonderful idea to use something like rent and salary that students can identify and relate to."

Students in this learning community were assigned reading in both courses in the link, a practice that some newer math faculty expressed concerns about. However, in talking about another assigned book — *Zero*, by Charles Seife — a student demonstrated that these joint assignments helped her understand the connections between what she was learning in her math class and her English class. She reported: "After reading the book, you see math everywhere. It's in nature. Something was there that I didn't realize. At first I didn't think I would need to know 'x= something', I didn't see that it applies everywhere, and now I do."

Faculty in focus groups at Queensborough described curricular integration strategies like these as exemplary, while acknowledging that faculty who were less experienced with the model created integrative assignments far less frequently. Analyses of syllabi collected from learning community faculty provide evidence of this variation. (Direct classroom observations were not conducted.) The syllabi were evaluated to assess the extent to which they included references to learning communities and practices commonly associated with learning communities, such as joint assignments and themed curriculum; a higher score reflects a greater number of references and thus a greater likelihood that the core components of learning communities were being implemented in those courses. As can be seen in Figure 3.2, the score for practices associated with linking and integration increases the most between the first semester and the second semester, but then drops again in subsequent semesters. The score for indicators of active and collaborative learning pedagogy remains relatively constant. (Appendix Table A.1 provides more detailed results from the syllabi analysis.)

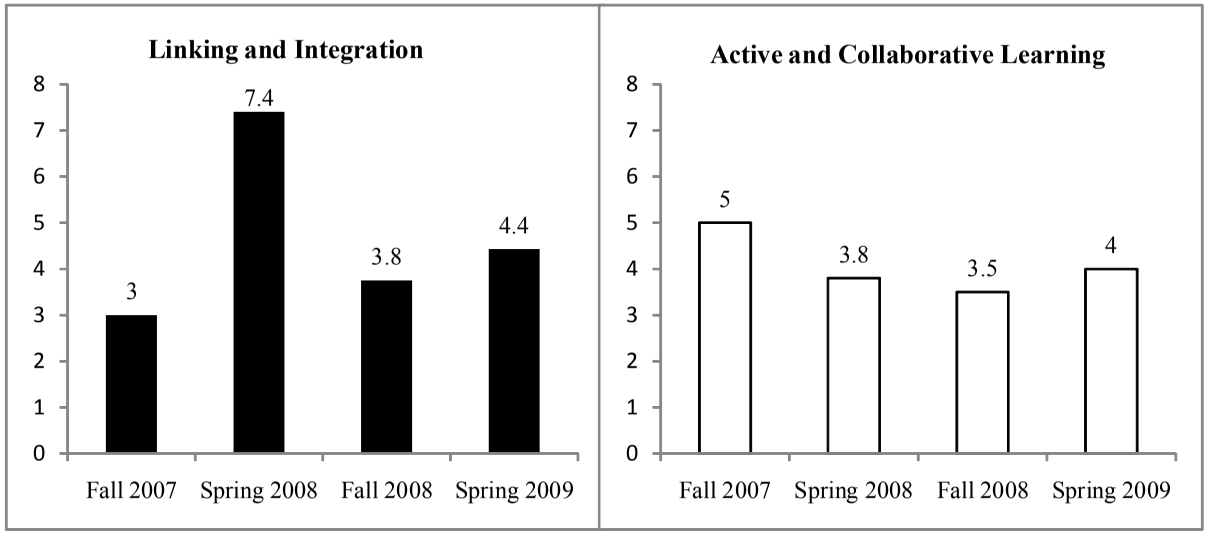
A high level of faculty turnover in the learning community program at Queensborough, largely as a result of the number of adjunct faculty teaching in the learning communities, may be related to the variation in curricular integration as reflected in focus groups and findings from the syllabi analysis. The stipend for faculty was an additional $650 a semester, but recruiting faculty and retaining them for more than one semester was a challenge.[12] A few faculty pairs were able to teach together for more than one semester, but this was not the case for the majority of the links in the demonstration, despite the coordinator's stated goal of faculty refining their integration, linking, and active and collaborative teaching methods by teaching together repeatedly. More than half (52 percent) of learning community faculty survey respondents were adjunct faculty members; these faculty were more likely than the full-time faculty to teach a class in one link for one semester, then leave the college or be assigned by their department to

[12]See Visher, Schneider, Wathington, and Collado (2010) for more on faculty turnover and stipends.

Figure 3.2

Queensborough: Average Scores on Two Dimensions from an Assessment of Learning Community Syllabi: Fall 2007-Spring 2009

Learning Communities for Students in Developmental Math



SOURCE: MDRC calculations using syllabi collected from learning communities at Queensborough Community College.

NOTES: Syllabi were evaluated using a rubric to calculate the number of references made to three key dimensions: references to learning communities, references to use of integrated curriculum, and references to use of active and collaborative instruction. References to learning communities and to the use of integrated curriculum are collapsed into the category "Linking and Integration." For a full list of the indicators in each dimension, see Appendix Table A.1.

Results are based on evaluations of two syllabus sets from learning communities in the fall 2007 semester, five syllabus sets from learning communities in the spring 2008 semester, eight syllabus sets from learning communities in the fall 2008 semester, and seven syllabus sets from the spring 2009 semester. The total of 22 syllabus sets represents 85 percent of all syllabi in use by learning communities at Queensborough Community College across the four semesters.

teach other classes the following semester.[13] In focus groups, full-time faculty discussed being partnered with adjuncts as one of the challenges to more collaboration and integration. They talked about resorting to phone calls, e-mails and interoffice mail, instead of the more frequent face-to-face meetings they could have when they were partnered with other full-time faculty.

Figure 3.3 compares the number of faculty who "returned" or taught in a learning community again with the number of "new" faculty. From the second semester onward, the number of returning faculty grew slowly but steadily. In the syllabi analysis, the low scores on integration and linking measures during the first and third semester may coincide with the fact that these semesters saw the greatest number of faculty members who were new to the learning communities program; the higher score in the second semester is likely buoyed by the returning faculty, such as the exemplary pair described above, who took advantage of their early involvement and training to incorporate many examples of curricular integration in their learning community. In contrast, newer faculty may have been unclear about cooperating with the coordinator, and adjuncts had less time on campus to collaborate with their partners. Both full-time and adjunct faculty also said that teaching in a learning community for the first time and being partnered with another first-timer made it difficult to collaborate and come up with effective integrative assignments. Inevitably, some instructors were not assigned to teach in the links until very close to the first day of class, and this made it difficult for the coordinator to communicate messages about her expectations for comprehensive learning communities.[14]

In summary, as the learning communities model evolved, especially between the first and subsequent semesters, the approach to developmental math began to differ somewhat. Some faculty incorporated more integrative instructional techniques and, in some math classes, integrated assignments, within the learning community. As noted above, the few faculty who taught together for more than one semester were able to fine-tune their assignments more than newer linkers. Faculty training opportunities helped newer faculty learn about more integrative assignments from instructors with more experience, but they generally needed multiple semesters to refine their learning community practice and syllabi to reflect these lessons.

Connection to Student Support Services

In the Queensborough learning communities, the primary connection to student support services available on campus was through the program coordinator. For example, over time more faculty began to report absences to the coordinator, who called students, offered assistance

[13]At most community colleges, the majority of developmental courses are taught by adjuncts, and this was also the case at all of the colleges in the demonstration. At Queensborough, both levels of developmental math and the introductory-level credit classes tended to be taught by part-time or adjunct faculty, as many full-time or tenure track faculty chose to teach more upper-level classes.

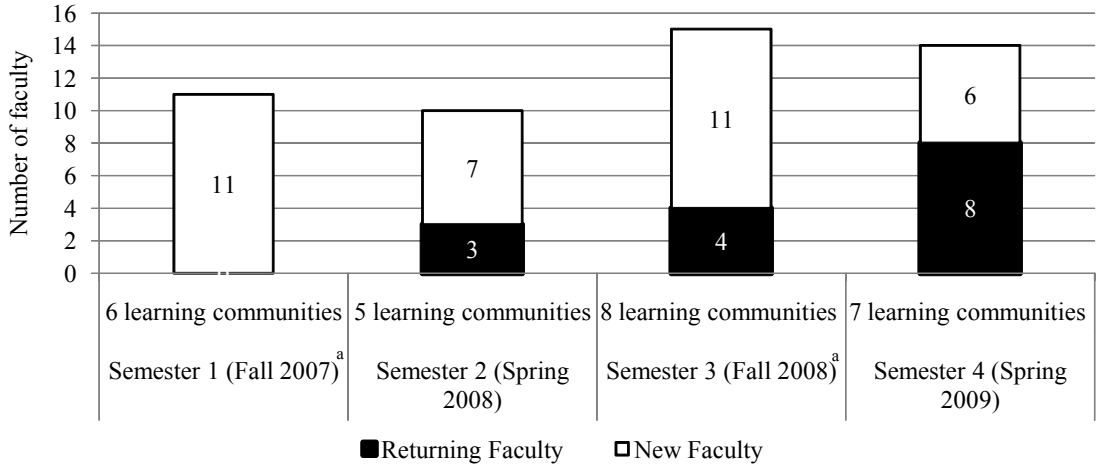
[14]See Visher, Schneider, Wathington, and Collado (2010) for more details on faculty recruitment issues.

The Learning Communities Demonstration

Figure 3.3

Queensborough Faculty Numbers

Learning Communities for Students in Developmental Math



SOURCE: MDRC field research.

NOTE:
[a]During the first and third semesters of the study (fall 2007 and 2008), one faculty member taught in two separate learning communities.

so they could return to class, or referred them to student services. The coordinator also gave faculty copies of flyers that advertised the college's math and writing tutoring centers, their hours, and other college services. There was also a designated counselor for program students from the second through the fourth semester. In an extreme case, a student in a learning community mentioned to the coordinator having suicidal thoughts; the coordinator referred the student to the counselor, who was able to provide assistance.

How the Learning Community Experience Differed from Regular Services for Developmental Students

As noted, a total of 1,034 students across four semesters were randomly assigned to either a program group, who for the most part enrolled in learning communities, or to a control group, who did not. Based on field research, the following section contrasts the experiences of some of the students in the links with those of the students who took regular courses.

Table 3.2 compares the courses students in both groups selected during the first semester of the study. The table shows that more program group students registered for courses than students in the control group — about 12 percent of the students assigned to the control group did not enroll in any classes at Queensborough that semester. Program group students also attempted a developmental math course at higher rates than control group students: 85 percent compared with 69 percent, for a statistically significant impact of 16 percentage points. This difference in attempting developmental math is important because it starts students on the path to college-level math, which is required for a degree or transfer. As described above, both program and control group students were assisted in registering for courses; it seems that the strong encouragement to enroll in learning communities led to higher enrollments in developmental math.

Table 3.3 compares the experiences and services that were available to students enrolled in learning communities with those available to students who enrolled in stand-alone classes. In terms of curricular integration, control group students were asked during a focus group to talk about how their classes might connect or relate to each other. The students had little to say about the topic, though one student said, "I don't think my classes connect." Based on interviews with a few faculty who taught stand-alone versions of the courses, integration, collaboration between faculty, and student cohorts were not being used in those classes.

Unlike the learning communities at Houston Community College, where strong relationships between students appeared to form in most of the linked classes, there was evidence that these ties were not as strong for the students at Queensborough. Nonetheless, relationships between students in learning communities appeared to be stronger than those between students in stand-alone classes. In focus groups, program group students reported overall satisfaction with the course and their instructors. One student said, "The other classes aren't like this. I feel more comfortable in these [the linked] classes. In my other classes, we don't know the other students. Kids are like, no 'goodbye,' no 'have a good weekend,' they're all just out of there."

Relationships between program group students and faculty varied among the links and seemed stronger in some learning communities than others. Some faculty in learning communities felt that they had strong bonds with their students, while others reported that they were struggling, perhaps because they lacked community college and learning communities teaching experience. Relationships between faculty and students appeared weaker in stand-alone courses: In a focus group with students from the control group, a student who had not experienced learning communities said, "I do not know my teacher's name."

The coordinator, faculty, and students talked about better attendance in the linked classes compared with other classes. Because of the block schedules, program group students could not really miss one class and show up to the other without the students and/or the instructor asking

The Learning Communities Demonstration

Table 3.2

Queensborough Course-Taking Patterns, Program Semester

Learning Communities for Students in Developmental Math

Outcome	Program Group	Control Group	Difference (Impact)	Standard Error
Program semester				
Registered for any courses (%)	92.3	88.4	3.9 *	2.3
Enrolled in a learning community (%)	85.2	0.1	85.1 ***	2.9
Attempted any developmental math[a] (%)	89.8	74.9	14.9 ***	3.0
Attempted Basic Math/Problem Solving	40.4	32.2	8.3	6.2
Attempted Elementary Algebra	49.3	42.8	6.6	6.1
Sample size (total = 1,034)	608	426		

SOURCE: MDRC calculations from Queensborough Community College transcript data.

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

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

The probability of being assigned to the treatment group varies within cohorts, and estimates are weighted to account for the different random assignment ratios. Standard errors are clustered by learning community link.

Estimates are adjusted by cohort and score on the pre-algebra placement test at baseline.

All measures are based on courses that sample members are still enrolled in at the end of the add/drop period.

[a]Includes MATH 005, MATH 010, and MATH 013. The percentage of students attempting any developmental math course may be less than the sum of students attempting either MATH 005 (Basic Math/Problem Solving) or MATH 010 /013 (Elementary Algebra) because some students enrolled in both MATH 005 and MATH 010/013.

why they missed the previous class. Additionally, it was reported that not all instructors seemed to enforce the college's attendance policy as much as the learning community faculty. As noted, the coordinator also called students who were absent or late and helped them resolve their problems so they could return to class. These features of the links seemed to encourage better attendance for the program group students than for the students in regular courses.

Increased student engagement among learning community students seemed to arise from increased accountability as well as stronger class attendance. A pair of the learning communities instructors said that their students see them "as their parents." Another professor in a link said, "Both instructors can reach out to students who might have some academic, social, or personal problems that affect their performance…both instructors can confer on how best to

The Learning Communities Demonstration

Table 3.3

Queensborough Program Differential during Semesters 2-4

Learning Communities for Students in Developmental Math

Program Feature	Learning Communities Program	Regular College Services
Curricular integration	• Courses include integrated assignments between developmental math and college-level courses	• Informal, at the discretion of faculty members • Limited, since students not all taking the same classes together
Faculty collaboration	• Stronger examples of collaboration among experienced faculty teaching pairs • Teaching pairs communicate about shared students • Teaching pairs collaborate with other faculty on syllabi or assigments for their linked courses • Some time spent planning linked assignments and projects. • Faculty attend discussions and professional development specifically for learning communities	•Instructors not expected to collaborate with each other • Instructors attend general profesional development events
Active learning	• Faculty assign group work and encourage discussion • Stronger examples of active learning in learning communities taught by experienced faculty teaching pairs	• Limited information on control group faculty's use of active learning strategies
Student engagement	• Some students created academic support networks within courses • Some students felt comfortable approaching faculty	• Students formed fewer relationships with peers within courses • Fewer students reported feeling comfortable approaching faculty
Connection to student support services	• Full-time learning communities coordinator provides information about services available on campus • Learning communities have a dedicated counselor • Access of services depends on students' needs	• Students have to initiate access to services depending on their needs

SOURCE: MDRC field research.

reach a student in that situation." In terms of accountability among the program group students, a Speech instructor from the learning communities said, "I make it clear to our students that I know what goes on in [the math instructor's] class."

Summary

The learning communities program that operated during the first semester was different from the program that ran during the second through fourth semesters. As the model was reconfigured, and the coordinator and faculty began to work toward including greater levels of collaboration, curricular integration, and student services in the learning communities, the program appeared to strengthen in some ways. Some faculty became more engaged and included more of these elements as they participated in professional development and gained learning communities experience. However, faculty turnover in many of the links limited Queensborough's ability to consistently maintain high levels of curricular integration and collaboration across all of the learning communities.

The implementation research presented in this chapter suggests that at least part of the college leaders' theory of change was correct; in particular, faculty reported that students in learning communities became better acquainted with their professors and attended class more regularly than was typical in these developmental-level courses. The next chapter compares the academic success levels of students in the two research groups both during the program semester and beyond, which will help determine whether the longer-term vision of the college's leaders was also correct.

Chapter 4

Program Impacts on Educational Outcomes at Queensborough Community College

This chapter examines the impacts of learning communities on students' outcomes at Queensborough Community College. At Queensborough, as described in Chapter 3, students who placed into developmental math at either of the two levels were eligible to participate in the Learning Communities Demonstration. In the first semester of the demonstration, each learning community linked a developmental math course with either a developmental English course or a college-level English course; in the subsequent three semesters, the learning communities linked one of the developmental math courses with a college-credit-bearing course.

The immediate goal of the learning communities at Queensborough was to improve students' progress and performance in developmental math, by linking students to one another, to another common course, and to student services. Since fulfilling math requirements poses a difficult hurdle for many community college students, if an intervention has an effect on this immediate goal, it may translate into improved persistence and overall progress toward a degree. This chapter examines differences in educational outcomes between developmental math students randomly assigned to participate for one semester in a learning community and those students randomly assigned to a control group. It focuses on the impact of the program on performance in the developmental math sequence, total credits earned, and on persistence in college. The impacts of learning communities are measured for the semester during which the program took place, the postprogram semester, and cumulatively at the end of the second postprogram semester. The impact of learning communities is also examined for three prespecified subgroups: earlier and later cohorts, relative skill level within assigned developmental math course, and gender.

Key Impact Findings

- Learning community students were significantly more likely than control group students to pass developmental math in the program semester and to pass the second math class in their sequence during the next semester.
- Although learning communities led students to pass math earlier in their college careers, by the end of the study, control group members had largely caught up with learning community students in the developmental math sequence.

- Learning communities led to a moderate increase in credits earned in the program semester, but had no impact on the cumulative credits that students earned by the end of the study.
- Students in the learning communities group were no more likely to persist at the college than their control group counterparts.
- The impacts were achieved primarily by students who entered the program in later semesters, following the maturation of Queensborough's learning communities. However, even for these students, the program had an impact on their early experiences, but had no lasting impact on cumulative outcomes.

Research Methods

This section describes the methods used to assess the impacts of learning communities at both Queensborough Community College and Houston Community College, although the impacts for Houston are discussed in Chapter 6. The basic research methods are very similar at both demonstration sites.[1]

For both the Queensborough and Houston learning community demonstrations, the impact analyses examine the differences in the outcomes between the program and control groups. The program and control group students were randomly assigned to either receive the learning communities "treatment" or not. Because students were assigned at random, program and control group students should have very similar characteristics, both observed and unobserved. The baseline characteristics data described in Chapter 2 document that observable characteristics are virtually indistinguishable for the two groups.

The estimated program impacts presented in the tables control for the cohort in which students entered the study and for students' scores on a pre-algebra placement test.[2] The

[1]Some small differences in the methods for the Houston impacts are noted in Chapter 6.

[2]The calculations are regression-adjusted with the outcome of interest on the left-hand-side and a dummy variable on the right-hand-side for whether the student was assigned to the program group or not. The cohort of entry is controlled for with a dummy variable for each cohort. Students' score on a pre-algebra placement test (COMPASS) are held constant to improve the precision of the estimates. Some students are missing placement test scores; these students are not included in the analyses of the impact of the learning communities on progression in the math sequence, since the courses in each student's sequence are determined by the scores on the math placement test. However, students with missing placement test scores are included in the analyses for persistence in college, credits earned, and credits attempted; their scores are imputed and a dummy variable indicating that the score is missing is also included in the regression. Additionally, the regressions are weighted to account for the fact that the probability of being randomly selected into the program or control group changed over time. Finally, in order to account for common shocks to all members of a learning community, the standard errors allow for correlations in the error term within a given learning community.

randomization of students into program and control groups ensures that students are the same in terms of both observable and unobservable characteristics that affect math class outcomes. Thus, the size of the estimated impact of the program is not affected by controlling for test scores and cohort. However, controlling for these characteristics can be important for the statistical precision of those estimated impacts. Consider controls for the cohort of entry. As described in the implementation chapters, students were enrolled in the study over a number of semesters and years, and differences in macroeconomic conditions over the years of the study may mean that different types of students were choosing to enter college, rather than work full time, as their labor market opportunities changed. Controlling for cohort ensures that the estimated impacts of the learning communities are calculated by comparing outcome differences between program and control group students who entered college at the same time, thus controlling for any conditions that changed over time that might, in and of themselves, affect student outcomes.[3]

It is important to note that the analyses presented throughout the impact chapters of this report are "intent-to-treat" calculations. This means that comparisons are made between those *assigned* to the program and control groups, whether or not they actually chose to participate in the learning community program; thus, the "program group" includes some students who did not actually take part in the learning community program. Students who chose to participate in the learning community, once assigned to it, may differ from those who chose not to, and in order to retain the integrity of the experiment, the entire program group is compared with the entire control group, regardless of what they chose to do.[4] Further, this is the right comparison to make if one is interested in the effect of trying to institute learning communities on a larger scale, because it is frequently the case that students (like everyone else) do not do exactly what they initially intend or are assigned to do. Thus, it is important to understand what would likely happen to students who are assigned to a given program, not just what happens to those who comply with a program's protocols. That said, at the Queensborough learning community demonstration site, as shown later in Table 4.2, the vast majority (85.2 percent) of students who were assigned to participate in a learning community actually enrolled in one and virtually none (0.1 percent) of the control group students enrolled.

The intent-to-treat impact analyses presented below use administrative data from the colleges to examine the impact of the learning communities on registering for courses in a given semester, math class outcomes (passing, attempting but not passing, and not attempting), and

[3]Additionally, the data set includes information on students' personal characteristics. As described in the data section, randomization resulted in the program and control group students having very similar observable characteristics. As expected, impact calculations that control for differences in characteristics between program and control group students yield very similar results to those presented here.

[4]For a detailed description of intent-to-treat analyses, see Bloom (2006).

total credits attempted and earned. Students' outcomes are observed for the semester during which the learning community program was in place and during the postprogram semesters. For Queensborough, students were followed for two postprogram semesters. For Houston, students were followed for only one postprogram semester. Outcomes are measured in each of the semesters and cumulatively at the end of the last postprogram semester. This allows one to see whether there was an immediate effect of the program, and then whether these differences persisted once the program semester ended. For example, suppose that students who participated in learning communities were more likely to sign up for and pass developmental math during the program semester. One might expect them to be more likely to sign up for and pass the next level of math in the subsequent semesters. Potentially, the students who participated in the learning community would be further along in math at the end of last postprogram semester. Alternatively, the learning community may primarily affect timing of the math classes such that program group students are more likely to attempt the first class in the sequence during the program semester, but control group students catch up over time. The results are presented first for the program semester, next for each postprogram semester, then cumulatively, measured at the end of the last postprogram semester.

As mentioned above, at Queensborough, the study targeted students whose math placement test scores indicated that they should take either the first or second developmental math class. For Queensborough, math outcomes are defined for "first math class in sequence" in the program semester, where "first math" is determined by students' math placement test scores.[5] The outcomes for the "first math class in sequence" represent the outcomes in the lowest-level developmental math class for students who placed into that class (Math 005: Basic Math) and the outcome in the second level of developmental math (Math 010/013: Elementary Algebra) for students who placed into the higher-level class. Subsequent outcomes are analogous: In the postprogram semesters, performance in the "second math class in sequence" is defined as performance in the second level of developmental math (Elementary Algebra) for those initially placed in the first level of developmental math, and performance in the first level of college math (Math 114/120/301/321) for those initially placed into the second level of developmental math.

[5]This analysis groups students according to their placement, not according to whether they complied with their placement recommendation. A student is defined as having the lowest level of developmental math as the "first in sequence" if his or her score on the COMPASS pre-algebra test was below Queensborough's self-determined cutoff, and having the second level of developmental math as the "first in sequence" if his or her score was above this cutoff. The cutoff changed over the years of the study, but was between 27 and 30 for all years. About half (49 percent) of the full sample placed into the lowest level of developmental math (Math 005), and 73 percent of these students took the course. For Math 010, 84 percent of those who placed into the course took it.

Students who were eligible for the study at Queensborough entered the study between May 2007 and January 2009. Participation in learning communities began in fall 2007, spring 2008, fall 2008, and spring 2009. The study then followed each cohort of program and control group students over time. For the complete group of 1,034 students, registration for courses and credits attempted and earned are analyzed for the program semester, the first postprogram semester, second postprogram semester, and cumulatively at the second postprogram semester. Math class outcomes are observed for the program semester, the first postprogram semester, and cumulatively at the second postprogram semester. Only 989 students are included in these analyses because 45 students were missing math placement test scores, which are essential for determining which courses are first, second, and third in the math sequence.

Results for the Full Sample

Math Progression Measures

The impacts of Queensborough's learning communities on students' math class performance are presented in Table 4.1. (See Box 4.1 for guidance on reading the impact tables in this report.) Table 4.1 shows math class performance for the first course in the sequence in the program semester, the second course in the sequence in the first postprogram semester, and cumulative outcomes at the end of the second postprogram semester for first and second math class in the sequence, and separately for Elementary Algebra (the course required before entering college level) and any college-level math course. For each of these measures of math class performance, the table presents three potential outcomes: passed, attempted but did not pass, and did not attempt. Each of these outcomes captures a different piece of the potential impact of learning communities on success in math.

Consider "did not attempt" first. Although Queensborough recommended that all students who placed into developmental math take these courses early in their college careers, many students did not act on that recommendation. Getting students to tackle their developmental math requirements early, in order to proceed to college-level work and progress toward a degree, was a particular emphasis of the learning community. As the impact estimates in Table 4.1 show, the learning community was successful in reducing the fraction of students who did not attempt to fulfill their developmental math requirement during the program semester. Only 15.4 percent of program group students did not attempt the developmental math class that they tested into, compared with 31.3 percent of control group students. The learning community is estimated to have reduced the nonattempts — or in other words, increased the attempt rate — by 15.9 percentage points; this estimate is statistically significantly different from zero. Here a negative number represents a beneficial impact of the program since it is a reduction in the

The Learning Communities Demonstration

Table 4.1

Queensborough Transcript Outcomes, Math Progression

Learning Communities for Students in Developmental Math

Outcome (%)	Program Group	Control Group	Difference (Impact)	Standard Error
Program semester progression				
First math in sequence[a]				
Passed	34.0	22.2	11.7 ***	4.1
Attempted but did not pass	50.6	46.4	4.2	3.7
Did not attempt	15.4	31.3	-15.9 ***	3.5
First postprogram semester progression				
Second math in sequence[b]				
Passed	11.3	6.0	5.3 ***	2.0
Attempted but did not pass	13.9	10.4	3.6	2.5
Did not attempt	74.8	83.6	-8.9 ***	3.4
Cumulative progression[c]				
First math in sequence[a]				
Passed	41.5	35.0	6.5	4.4
Attempted but did not pass	46.2	46.6	-0.3	3.8
Did not attempt	12.2	18.4	-6.2 **	2.9
Second math in sequence[b]				
Passed	17.3	15.4	2.0	2.5
Attempted but did not pass	19.7	16.3	3.5	3.0
Did not attempt	63.0	68.4	-5.4	3.6
Cumulative completion[c]				
Elementary Algebra[d]				
Passed	28.1	26.0	2.0	3.2
Attempted but did not pass	41.3	37.1	4.2	4.3
Did not attempt	30.6	36.9	-6.3	4.2
College-level math				
Passed	10.0	10.4	-0.4	2.0
Attempted but did not pass	6.7	4.7	2.1	1.5
Did not attempt	83.3	84.9	-1.7	2.5
Sample size (total = 989)	575	414		

(continued)

Table 4.1 (continued)

SOURCE: MDRC calculations from Queensborough Community College transcript data.

NOTES: Students who did not take the COMPASS pre-algebra placement test prior to random assignment are excluded from this table.

Rounding may cause slight discrepancies in sums and differences.

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

The probability of being assigned to the treatment group varies within cohorts, and estimates are weighted to account for the different random assignment ratios. Standard errors are clustered by learning community link.

Estimates are adjusted by cohort and score on the pre-algebra placement test at baseline.

All measures are based on courses that sample members are still enrolled in at the end of the add/drop period.

[a]Includes MATH 005 for those placed into MATH 005 at baseline. Includes MATH 010 and MATH 013 for those placed into MATH 010/013.

[b]Includes MATH 010 and 013 for those placed into MATH 005 at baseline. Includes MATH 114, 120, 301, and 321for those placed into MATH 010/013.

[c]Cumulative measures include courses taken from the program semester through the second postprogram semester, and include summer terms.

[d]Includes MATH 010 and 013.

fraction of students who did not comply with the college's recommendation. This represents at least a 50 percent reduction in students' noncompliance with a recommended course of action.[6]

Attempting a required course is a necessary first step in fulfilling the requirement, but ultimately one cares more about whether students were successful in passing the class. If more students attempted their assigned developmental math class, one might see a mechanical increase in passing, simply driven by the increase in attempts. The table shows the program impact for both passing the class and for attempting but *not* passing. If the program impact is simply mechanical — more people took the class so more people pass and more people fail or withdraw — then there will be proportionate increases in both the "pass" and "attempted but did not pass" categories.[7] If there was an *increase* in the percent of students who passed the course and a *decrease* in the percent of students who took but did not pass the course, then that represents strong evidence that the program helped students perform better in the course.

In the program semester, there was a statistically significant increase in the percentage of students who passed the first math course in their sequence. The estimated 11.7 percentage point increase represents a 53 percent increase in students passing the developmental math class

[6]The percentage reduction in noncompliance is calculated by dividing the 15.9 percentage point reduction in nonattempts, divided by 31.3, the nonattempt percentage for the control group: (15.9/31.3)x100 = 50.7 percent.

[7]"Attempted but did not pass" includes both those who failed and those who withdrew.

Box 4.1

How to Read the Impact Tables in This Report

Most tables in this report use a similar format, illustrated below. The abbreviated table below displays transcript data and shows some educational outcomes for the program group and the control group. The first row, for example, shows that 34.0 percent of the program group members and 22.2 percent of the control group members passed their first developmental math class.

Because individuals were assigned randomly either to the program group or to the control group, the *impacts* of the program can be estimated by the difference in outcomes between the two groups. The "Difference" column in the table shows the differences between the two research groups' outcomes — that is, the program's estimated impacts on the outcomes. For example, the estimated impact on passing the first developmental math class in the sequence can be calculated by subtracting 22.2 percent from 34.0 percent, yielding an increase or estimated impact of 11.7 percentage points. Thus the term *impact* refers to the "added value" of the program, or the program's effects that go above and beyond the effects of the services provided to the control group. This difference represents the *estimated* impact rather than the *true* impact because, although study participants are randomly assigned to the program and control groups, there is still a possibility that differences could be observed by chance.

Differences marked with one or more asterisks are *statistically significant*, meaning that there is a high probability that the program had an impact (positive or negative) on student outcomes. The number of asterisks indicates the probability that one would see similarly large impacts, if in reality the program had no impact. One asterisk corresponds to a 10 percent probability; two asterisks, a 5 percent probability; and three asterisks, a 1 percent probability. For example, as the first row of the table excerpt shows, the program's estimated impact on students passing a developmental math course is 11.7 percentage points. The three asterisks indicate that this difference is statistically significant at the 1 percent level, meaning that there is less than a 1 percent chance of observing a difference this large if the program actually had no effect on students' passing developmental math. In other words, one can be 99 percent confident that the program had a positive impact on students passing developmental math.

The statistical significance is calculated using the standard error of the impact estimate, shown in the last column. The standard error is a measure of uncertainty or variability around the impact estimate. Some useful rules of thumb are that there is about a 90 percent chance that the true impact is within plus or minus 1.65 standard errors of the estimated impact, roughly a 95 percent chance that the true impact is within plus or minus 1.96 standard errors of the estimated impact, and about a 99 percent chance that the true impact is within plus or minus 2.58 standard errors of the estimated impact. For example, in the first row of data below, there is roughly a 95 percent chance that the program's impact on students' likelihood of passing a developmental math course lies between 3.67 and 19.74 percentage points, calculated as $11.7 \pm (1.96 \times 4.1)$.

Outcome	Program Group	Control Group	Difference (Impact)		Standard Error
First math in sequence (%)					
Passed	34.0	22.2	11.7	***	4.1
Attempted but did not pass	50.6	46.4	4.2		3.7
Did not attempt	15.4	31.3	-15.9	***	3.5

to which they were assigned, and this estimated impact is highly statistically significant.[8] The percent of students who took but did *not* pass their developmental math course also increased, but this increase is not statistically different from zero, that is, the increase might very well have resulted by chance. The increase in the overall percentage of students who passed their developmental math classes may represent a combination of the learning community program encouraging students who were capable of passing developmental math to actually attempt it, *and* helping some students who might otherwise have dropped out or failed to perform better in their math classes.

In order to examine whether the learning communities had an effect beyond the program semester, one must follow students' outcomes after the semester-long program ended. Table 4.1 shows students' performance in the second math class in their sequence during the first postprogram semester; recall that this was the second developmental math course for the students with lower math placement test scores and a college-level math course for students with higher math placement test scores. Program group students are estimated to have been 8.9 percentage points more likely than control group students to attempt the second class in their math sequence; this impact is highly statistically significant. This increase in attempts at the next level of math is made possible by the impact experienced in the program semester, when more program group than control group students passed the first course and became eligible to take the second course in the sequence. In addition, 5.3 percentage points more program group than control group students are estimated to have passed the second course in the sequence, and this impact is also statistically significant. Although the learning community appears to have improved progression in the math sequence from the program semester to the postprogram semester, the percentage of students making this transition was strikingly low for both the program and the control groups: only 11.3 percent and 6.0 percent of program and control group students, respectively, passed their second course in math.

Math class outcomes measured cumulatively at the end of the second postprogram semester are shown in the bottom half of Table 4.1. Most of the differences in math class performance between program and control group students have disappeared two semesters after the program ended. Students assigned to learning communities were still more likely to have ever attempted a developmental math class (6.2 percentage points *less* likely to have *not* attempted the first course in their developmental math sequence), but control group students had caught up in passing the first and second math courses. Similarly, there is no evidence that program students were more likely to attempt, or to attempt and pass, the third course in their math sequence (not shown on this table because very few students reached this level). To

[8]The percentage increase is the impact divided by the outcome for the control group: (11.7/22.2)*100=52.7 percent.

understand the program's impact on students' likelihood of completing their developmental math requirement or the first college-level course, the table also presents cumulative outcomes for Elementary Algebra and *any* college-level math class: The estimated program impact on cumulative attempt and pass rates for these measures is not statistically different from zero.

It is important to keep in mind that as more semesters passed after the program, there was also more potential for students to leave Queensborough, and only those who remained would have administrative records indicating that they attempted a subsequent math course at Queensborough. If students assigned to a learning community were more likely than control group students to transfer to a four-year college, for example, and continue in college math there, these data would not show that. However, if that were the case, one might expect to see a difference in the probability that program and control group students register for courses at Queensborough. Those outcomes will be discussed in the following section.

Persistence in College and Credit Accumulation

If learning communities are successful in helping students to overcome a serious barrier to college success — required developmental math courses — then they may potentially help students persist in college and make faster progress toward a degree. Furthermore, learning communities may provide students with a sense of belonging and additional skills that could increase their rates of college persistence. Table 4.2 shows the estimated impact of the learning communities program on the percentage of students who register for a given semester as a measure of persistence. As the top panel of the table shows, students assigned to a learning community are estimated to be 3.9 percentage points more likely to register for the program semester, and this impact is statistically significant at the 10 percent level. However, program group students are no more likely to register for either the first or second postprogram semesters than control group students. At the end of the second postprogram semester, there is no difference between program and control group students in terms of the total number of semesters for which they have registered.

Table 4.2 shows that program group students attempted and earned an estimated 0.7 more credits than control group students in the program semester. This is consistent with the fact that program group students were more likely than control group students to pass a math class in the program semester. In the first and second postprogram semesters, however, there is no statistical difference between the two groups in terms of credits attempted or earned. Cumulatively, the impact observed in the program semester was no longer large enough to be statistically significant by the end of the second postprogram semester.

It is important to keep in mind that students who do not continue at Queensborough may have dropped out of college permanently or for a brief period, or they may have transferred to another community college or a four-year institution. The evidence here indicates that

The Learning Communities Demonstration

Table 4.2

Queensborough Transcript Outcomes, Credit and Persistence Measures

Learning Communities for Students in Developmental Math

Outcome	Program Group	Control Group	Difference (Impact)	Standard Error
Program semester				
Registered for any courses (%)	92.3	88.4	3.9 *	2.3
Enrolled in a learning community (%)	85.2	0.1	85.1 ***	2.9
Number of credits attempted	12.3	11.6	0.7 *	0.3
Regular credits	6.4	6.1	0.2	0.3
Developmental credits	5.9	5.5	0.4	0.3
Number of credits earned	6.8	6.1	0.7 *	0.4
Regular credits	4.3	3.8	0.5	0.3
Developmental credits	2.6	2.3	0.2	0.2
First postprogram semester				
Registered for any courses (%)	71.9	69.1	2.8	2.9
Number of credits attempted	9.0	8.5	0.5	0.4
Regular credits	6.3	6.0	0.3	0.3
Developmental credits	2.8	2.5	0.2	0.2
Number of credits earned	5.3	4.9	0.4	0.4
Regular credits	4.1	3.8	0.3	0.3
Developmental credits	1.1	1.1	0.1	0.1
Second postprogram semester				
Registered for any courses (%)	58.8	55.8	3.0	3.4
Number of credits attempted	7.1	7.1	0.1	0.5
Regular credits	5.6	5.4	0.2	0.4
Developmental credits	1.5	1.7	-0.2	0.1
Number of credits earned	4.4	4.3	0.0	0.4
Regular credits	3.8	3.8	0.0	0.4
Developmental credits	0.6	0.5	0.0	0.1

(continued)

Table 4.2 (continued)

Outcome	Program Group	Control Group	Difference (Impact)	Standard Error
Cumulative[a]				
Number of semesters registered for any courses	2.4	2.3	0.0	0.1
Number of credits attempted	29.2	28.4	0.8	1.0
Regular credits	18.5	18.0	0.5	0.9
Developmental credits	10.7	10.3	0.3	0.6
Number of credits earned	16.9	16.0	0.8	1.1
Regular credits	12.4	11.8	0.6	0.9
Developmental credits	4.5	4.3	0.2	0.4
Sample size (total = 1,034)	608	426		

SOURCE: MDRC calculations from Queensborough Community College transcript data.

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

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

The probability of being assigned to the treatment group varies within cohorts, and estimates are weighted to account for the different random assignment ratios. Standard errors are clustered by learning community link.

Estimates are adjusted by cohort and score on the pre-algebra placement test at baseline.

All measures are based on courses that sample members are still enrolled in at the end of the add/drop period.

[a]Cumulative measures include courses taken from the program semester through the second postprogram semester, and include summer terms.

program and control group students continue at Queensborough at the same rates, but it is impossible to tell whether program and control group students who leave Queensborough do the same things once they leave. It is conceivable that students in the program group were more likely to have left Queensborough to transfer to another institution, while students in the control group were more likely to drop out of college. However, given the modest program impacts on credits earned during the program semester and the similarity in program and control group students' experiences at Queensborough in postprogram semesters, it appears likely that the experiences of students who left Queensborough would be similar as well. Additional data from other colleges would be necessary to understand the experiences of these students; the final synthesis report in the Learning Communities Demonstration will further address this issue.

Summary of Results for the Full Sample

Queensborough's learning community program appears to have successfully increased students' probability of taking and passing developmental math classes during the program semester, and this initial progress continued into the first postprogram semester, with more program than control group students passing the second course in their math sequence. Howev-

er, by the end of the second postprogram semester, control group students' probability of having passed each math classes in the sequence had caught up to that of program group students. Overall, the learning communities had no effect on persistence in college or credits earned cumulatively over three semesters.

In other words, the learning communities effectively changed students' course-taking and passing during the period when students were explicitly participating in the program. All students who placed into developmental math were told that they needed to take and pass those classes, and the results here are consistent with students in learning communities having received and taken the advice to try to fulfill that requirement early in their college careers. Students in the control group took longer to attempt the courses in the math sequence, but by the end of the second postprogram semester, control group students had largely caught up, and their math outcomes are statistically indistinguishable from those of program group students. These results provide compelling evidence that participation in a one-semester learning community at Queensborough is not enough to change students' paths through the entire math sequence.

Subgroup Analyses

In addition to examining the overall impacts of Queensborough's learning communities, this study analyzes the results for three pre-specified subgroups: earlier and later cohorts, level of developmental need, and gender.

Cohort

As the implementation analysis in Chapter 3 discusses, the learning communities at Queensborough changed over time. In particular, the first cohort likely received a very different treatment from the subsequent cohorts. First, the learning communities model and, possibly, the types of students in the learning communities changed over time.[9] In the first cohort, the learning communities offered both developmental and college-level English, so there was a subset of students in the first cohort who required both developmental math and developmental English. In later semesters, the math courses were linked only to college-level courses. Additionally, the learning community developed into a more comprehensive intervention over time.[10] For these reasons, one might expect that the program's impact changed over time as well. Table 4.3 presents the impacts calculated for the first cohort in the left-hand panel and all subsequent

[9]Despite this difference, however, students in the first cohort were generally similar to students in the subsequent cohorts in terms of the baseline characteristics presented in Table 2.4.

[10]At Hillsborough Community College, maturation of the developmental reading learning communities program over time was associated with increases in the program's impacts, suggesting that similar increases could be seen at Queensborough. See Weiss, Visher, and Wathington (2010).

The Learning Communities Demonstration

Table 4.3

Queensborough Transcript Outcomes by Cohort, Math Progression

Learning Communities for Students in Developmental Math

Outcome (%)	First Cohort				Subsequent Cohorts				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Program semester progression									
First math in sequence[a]									
Passed	19.7	24.1	-4.4	6.5	37.3	21.8	15.4 ***	4.7	††
Attempted but did not pass	60.6	43.6	17.0 **	7.9	48.2	47.1	1.2	4.2	†
Did not attempt	19.7	32.3	-12.5	8.4	14.5	31.1	-16.6 ***	3.7	
First postprogram semester progression									
Second math in sequence[b]									
Passed	6.1	4.9	1.2	3.3	12.5	6.2	6.3 ***	2.4	
Attempted but did not pass	8.7	9.1	-0.4	3.8	15.1	10.7	4.4	2.8	
Did not attempt	85.2	86.0	-0.8	5.5	72.4	83.1	-10.7 ***	3.9	
Cumulative progression[c]									
First math in sequence[a]									
Passed	32.0	32.3	-0.2	8.6	43.7	35.6	8.1	5.0	
Attempted but did not pass	53.7	44.7	9.0	9.0	44.5	47.0	-2.5	4.2	
Did not attempt	14.3	23.0	-8.7	6.8	11.8	17.3	-5.6 *	3.2	
Second math in sequence[b]									
Passed	10.3	14.9	-4.7	4.9	19.0	15.4	3.6	2.8	
Attempted but did not pass	12.1	15.8	-3.7	4.7	21.5	16.4	5.1	3.5	
Did not attempt	77.7	69.3	8.4	6.9	59.5	68.2	-8.7 **	4.1	††

(continued)

Table 4.3 (continued)

Outcome	First Cohort				Subsequent Cohorts				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Cumulative completion[c]									
Elementary Algebra[d]									
Passed	26.2	24.9	1.2	9.2	28.6	26.2	2.3	3.3	
Attempted but did not pass	47.7	48.3	-0.6	9.4	39.8	34.6	5.3	4.8	
Did not attempt	26.1	26.7	-0.7	9.2	31.6	39.2	-7.6	4.7	
College-level math									
Passed	5.8	9.6	-3.9	4.3	11.0	10.6	0.5	2.3	
Attempted but did not pass	4.0	3.8	0.2	2.7	7.4	4.9	2.5	1.7	
Did not attempt	90.2	86.5	3.7	5.8	81.6	84.6	-3.0	2.7	
Sample size (total = 989)	99	86			476	328			

SOURCE: MDRC calculations from Queensborough Community College transcript data.

NOTES: Students who did not take the COMPASS pre-algebra placement test prior to random assignment are excluded from this table.

Rounding may cause slight discrepancies in sums and differences.

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

A two-tailed t-test was applied to differences of impacts between subgroups. Statistical significance levels are indicated as: ††† = 1 percent; †† = 5 percent; † = 10 percent.

The probability of being assigned to the treatment group varies within random assignment cohorts, and estimates are weighted to account for the different random assignment ratios. Standard errors are clustered by learning community link.

Estimates are adjusted by cohort and score on the pre-algebra placement test at baseline.

All measures are based on courses that sample members are still enrolled in at the end of the add/drop period.

[a]Includes MATH 005 for those placed into MATH 005 at baseline. Includes MATH 010 and MATH 013 for those placed into MATH 010/013.

[b]Includes MATH 010 and 013 for those placed into MATH 005 at baseline. Includes MATH 114, 120, 301, and 321 for those placed into MATH 010/013.

[c]Cumulative measures include courses taken from the program semester through the second postprogram semester, and include summer terms.

[d]Includes MATH 010 and 013.

cohorts in the right-hand panel. It is important to understand that this division of the data is dictated by the implementation findings and is not an *ex-post* designation after analyzing the data. However, this analysis can detect only whether or not there was a change in the impact of the program over time, not the source of that change.

Overall, the cohort analysis suggests that students in the subsequent cohorts benefited more from the learning communities than those in the first cohort. The estimated impact on taking and passing the first math course is statistically different for the first and subsequent cohort groups in the program semester, as indicated by the dagger symbols at the far right of the table. For the later cohorts, the estimated impact on passing the first math course in the sequence is positive and statistically significantly different from zero for the later cohorts. For the first cohort, the only statistically significant estimated impact of the learning community is that it increased the percentage of students who attempted, but did not pass, the first math course in their sequence.[11] The cumulative evidence, measured at the end of the second postprogram semester, also shows some evidence that the program impact was somewhat different for the later cohorts. Program students in later cohorts were more likely to have attempted the second course in their math sequence than control group students, and this estimated impact is statistically different from the estimated impact for the first cohort. However, neither group of students experienced cumulative positive impacts on pass rates in their math courses.

The impact of the learning community, by cohort subgroup, on persistence in college and credits attempted and earned is presented in Table 4.4. There is little evidence that the impact of the program on these outcomes was statistically different between the first and later cohorts, and — as with the full sample — there were no measurable impacts on cumulative measures of persistence or credits earned.

Relative Level of Developmental Need

This section investigates whether learning communities had a differential impact for those students with the greatest need for math remediation in a given math course, compared with those with relatively better math preparation or skills in that math course. As described previously, students at Queensborough took math placement tests in order to determine whether they required developmental math, and if they did, which level of math was appropriate. This section uses the score on the placement test to determine if a student's placement test score was

[11]The first cohort has only 200 students, and this small sample size makes it difficult to say whether differences between program and control group students represent an impact of the program or arise from chance; the estimated program impacts for this cohort are not statistically different from zero. The subsequent cohorts have more students in them, however, so there are instances where it is possible to say that the differences in estimated impacts for the first and subsequent cohorts are statistically different from one another.

The Learning Communities Demonstration

Table 4.4

Queensborough Transcript Outcomes by Cohort, Credit and Persistence Measures

Learning Communities for Students in Developmental Math

Outcome	First Cohort				Subsequent Cohorts				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Program semester									
Registered for any courses (%)	88.0	88.8	-0.8	6.2	93.3	88.2	5.1 **	2.4	
Enrolled in a learning community (%)	77.0	0.3	76.7 ***	8.7	87.1	0.0	87.0 ***	2.9	
Number of credits attempted	12.1	11.9	0.2	0.9	12.4	11.6	0.8 **	0.4	
Regular credits	5.2	5.5	-0.2	0.8	6.7	6.3	0.4	0.3	
Developmental credits	6.9	6.5	0.4	0.9	5.7	5.3	0.4	0.4	
Number of credits earned	5.8	6.0	-0.2	0.9	7.1	6.2	0.9 **	0.4	
Regular credits	3.6	3.1	0.5	0.8	4.4	3.9	0.5	0.4	
Developmental credits	2.2	2.9	-0.7	0.5	2.7	2.2	0.4	0.3	††
First postprogram semester									
Registered for any courses (%)	70.1	70.7	-0.6	7.4	72.5	68.6	3.8	3.1	
Number of credits attempted	9.0	8.7	0.3	1.0	9.0	8.5	0.5	0.4	
Regular credits	5.8	6.2	-0.4	0.9	6.4	5.9	0.4	0.4	
Developmental credits	3.1	2.5	0.7	0.8	2.7	2.6	0.1	0.2	
Number of credits earned	4.7	4.8	-0.1	1.0	5.4	4.9	0.5	0.4	
Regular credits	3.5	3.7	-0.2	0.9	4.3	3.8	0.4	0.3	
Developmental credits	1.1	1.1	0.1	0.4	1.1	1.1	0.1	0.1	

(continued)

Table 4.4 (continued)

Outcome	First Cohort				Subsequent Cohorts				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Second postprogram semester									
Registered for any courses (%)	53.1	53.4	-0.2	8.2	60.2	56.3	4.0	3.7	
Number of credits attempted	6.7	6.7	0.0	1.1	7.3	7.2	0.1	0.5	
Regular credits	4.7	4.8	-0.1	1.0	5.9	5.5	0.3	0.5	
Developmental credits	1.9	1.8	0.1	0.3	1.4	1.6	-0.2	0.2	
Number of credits earned	3.7	4.3	-0.6	1.2	4.5	4.3	0.2	0.4	
Regular credits	2.9	3.7	-0.8	1.0	4.0	3.8	0.2	0.4	
Developmental credits	0.8	0.7	0.2	0.2	0.5	0.5	0.0	0.1	
Cumulative[a]									
Number of semesters registered for any courses	2.2	2.2	0.0	0.2	2.4	2.4	0.1	0.1	
Number of credits attempted	28.2	27.8	0.4	2.5	29.5	28.4	1.0	1.1	
Regular credits	15.9	16.8	-0.9	2.5	19.2	18.3	0.9	0.9	
Developmental credits	12.3	11.0	1.3	1.7	10.3	10.2	0.1	0.6	
Number of credits earned	14.5	15.4	-1.0	2.9	17.5	16.2	1.3	1.2	
Regular credits	10.1	10.7	-0.6	2.6	12.9	12.0	0.9	1.0	
Developmental credits	4.4	4.7	-0.4	0.8	4.6	4.2	0.4	0.4	
Sample size (total = 1,034)	105	90			503	336			

SOURCE: MDRC calculations from Queensborough Community College transcript data.

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

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

A two-tailed t-test was applied to differences of impacts between subgroups. Statistical significance levels are indicated as: ††† = 1 percent; †† = 5 percent; † = 10 percent.

The probability of being assigned to the treatment group varies within random assignment cohorts, and estimates are weighted to account for the different random assignment ratios. Standard errors are clustered by learning community link.

Estimates are adjusted by cohort and score on the pre-algebra placement test at baseline.

All measures are based on courses that sample members are still enrolled in at the end of the add/drop period.

[a]Cumulative measures include courses taken from the program semester through the second postprogram semester, and include summer terms.

"Below the Median" or "Above the Median" for students placed into the same level of developmental math. Thus, the "Below Median" group contains students with the lowest test scores among those placed into the lowest level developmental math class, *and* students with the lowest test scores among those placed into the higher-level developmental math class. The "Above Median" group is defined analogously. This analysis will show, for example, if connecting students to each other and to academic services is particularly helpful for students who have the lowest math skills in their particular class.

The analysis found no statistically significant differences in the impact of the learning community by relative level of developmental need, as indicated by the absence of dagger symbols in the right-hand columns of Appendix Tables A.2 and A.3.

Gender

Because many community college outcomes differ by gender and because the impacts of Kingsborough's Opening Doors learning communities were somewhat larger for men than for women, an analysis was conducted to determine if learning communities at Queensborough have a differential impact by gender. This subgroup analysis found somewhat larger effects for women than for men, though these gender differences were generally not statistically significant.

As can be seen in Appendix Table A.4, there are no statistically measurable differences in the program semester between women and men. At the end of the second postprogram semester, it appears that women in the program group were more likely than women in the control group to have attempted and passed the second math class in their sequence, and this effect is statistically different than that for men. For the other measures, as shown in Appendix Table A.5, there are few differences between the impacts (or lack thereof) experienced by women and men at Queensborough.

Summary of Queensborough Community College Results

Learning communities at Queensborough led to more students passing developmental math courses in the program semester, but by the end of the second postprogram semester, students in the control group had largely caught up with those who had experienced learning communities. The program impacts appear larger for later cohorts of students, who were arguably exposed to a more comprehensive learning community program. Even so, the program semester differences in outcomes were largely gone two semesters after the program for this later cohort of students. These results suggest that the main effect of the semester-long learning communities at Queensborough was to shift students to taking developmental math earlier in their college careers, but this alone did not lead to sustained educational impacts on the probability of passing developmental math, on persistence in college, or on total credits earned.

Chapter 5

The Learning Communities Program at Houston Community College

Across a sprawling metropolis, tens of thousands of students each year pass through the doors of Houston Community College's many commuter campuses. Among the largest open-access institutions in the country, the successes and challenges of Houston's student body are reflective of national trends. As part of the college's participation in the national Achieving the Dream initiative, Houston's administration looked closely at student data to inform its decisions about which strategies to employ to increase success rates among underachieving students.[1] As a result of this process, the leadership chose to develop learning communities that link the lowest level of developmental math with a student success course.

The goal of this course structure was threefold. First, including a student success course in the link could boost pass rates in math and other courses by providing extra support for students' learning. Second, as the student success course was required for all students during their first semester at Houston, the college hoped that attaching math to the mandatory course would increase the likelihood that students would take math early on. Finally, administrators and faculty believed that co-enrollment in the learning community courses would encourage the formation of strong relationships among students, and that these bonds could go far in counteracting the sense of anonymity that such a large institution can create.

The key findings of the implementation research demonstrate that at least two of the goals of the program were achieved; the impact research presented in Chapter 6 will reveal whether the learning communities also met the college's primary goal of increasing students' achievement. The implementation findings underscore the fact that the programs at each of the three participating campuses improved over time, as they scaled up to serve more students:

- **Co-enrollment in courses and the formation of student cohorts was the most salient feature of the learning communities**. Students and faculty reported that the cohorts created a more comfortable classroom environment and made students feel supported both personally and academically.

- **Learning community students enrolled in developmental math at a significantly higher rate than control group students.** Program group stu-

[1] Achieving the Dream is a national initiative, funded by Lumina Foundation for Education, to promote data-driven reform in community colleges, with a special focus on low-income students and students of color. Houston Community College was in the first round of colleges to join the initiative in 2004.

dents were strongly encouraged to enroll in the learning communities — including the developmental math course — while control group students were told that developmental math was recommended but not necessary. As a result of enrolling in the learning communities, program group students also enrolled in the required student success course at significantly higher rates.

- **Over the course of the demonstration, the level of curricular integration in the learning communities increased from very minimal to basic.** During the final semesters of the demonstration, each learning communities coordinator expected at least three integrated assignments, and most faculty complied with or exceeded this expectation. These curricular linkages were additionally supported by informal linkages between the courses and instructors.

- **The level of faculty collaboration varied among teaching partners but generally increased over the course of the demonstration.** Collaboration tended to focus on the needs of shared students rather than curricular link-ages.

- **There was variation in the implementation of the learning communities at each of the three campuses, though each program exhibited similar patterns of improvement over time.** The learning community model each campus used differed, in particular, in the kinds of supplementary services offered, such as tutoring, counseling, and field trips. At the final campus to join the demonstration, the learning communities matured more quickly, as a result of strong leadership and the development of systematic training for new faculty.

- **The cost of the learning community program at Houston was relatively modest.** Though there was variation across the campuses, the average program cost was about $120 per student each semester, above and beyond typical college expenditures on services for developmental math students. Additional costs were generated by increased use of student services as a result of the learning community.

This chapter begins by describing the learning community program at Houston and the means by which both faculty and students arrived in learning community classrooms during the demonstration. It goes on to provide evidence of how comprehensive the learning communities at Houston were, in terms of the key components of the model. The reader is then walked

through an estimate of the costs of one semester of the program.[2] Finally, the chapter discusses how the program created different experiences for students in the learning communities, as opposed to standard services at the college.

The Program: A "Basic" Model for Students at the Lowest Level of Developmental Math

The learning communities in the demonstration at Houston almost exclusively linked the lowest level of developmental math — Fundamentals of Mathematics I (Math I) — with a student success course — College and Career Planning.[3] As described in Chapter 2, Houston split the developmental math sequence into three levels, whereas Queensborough's sequence comprises two courses. After passing Fundamentals of Math I at Houston, students must pass both Fundamentals of Mathematics II and Intermediate Algebra before they can take a college-level course. Math I is required for all students who assess into it, but even though students are encouraged to take it during their first semester of enrollment, this is not a requirement.

The student success course that is included in all of the learning communities is designed to introduce Houston students to tools and strategies for reaching their college and career goals. With this in mind, the student success curriculum includes lessons on time management, study and test-taking skills, goal-setting, and available campus resources such as tutoring, financial aid, and the library. Unlike developmental math, college policy requires all students to take the student success course during their first semester of enrollment.[4]

Though Houston had offered some learning communities for several years as a result of interest by individual administrators and faculty members, it was not until the Learning Communities Demonstration began in 2007 that the program was scaled up in any systematic way, supported primarily by Achieving the Dream funds.[5] Each of the three campuses involved had an individual faculty coordinator or coordinating team for the learning community program. Previously, these campuses had little to no experience with this way of structuring courses, and

[2]These analyses were conducted at Houston only, to represent the cost of basic learning communities for developmental math students. Houston was chosen over Queensborough as a result of the timing and availability of data.

[3]One learning community linked Fundamentals of Mathematics II with the same student success course.

[4]During the first semester of the demonstration (spring 2008), college policy required the student success course only for new developmental-level students; as of fall 2008, the policy shifted to require all new students to take the course, regardless of developmental requirements. This policy change had no effect on the students in the demonstration.

[5]Achieving the Dream funds were used to support program costs beyond faculty salaries. The learning community programs at several Houston campuses that did not participate in the demonstration also expanded during this time, in line with the college's overall Achieving the Dream plan.

as a result, the initial semesters of the demonstration reflected a learning curve on the part of both program coordinators and faculty.

Previous research has found that coordinators have a strong influence over the implementation of college programs, and Houston is no exception.[6] Though faculty members were ultimately responsible for the form and content of their learning communities, the coordinators set expectations about what a learning community should look like and were responsible for giving faculty the time and tools they needed to work with teaching partners to reach these goals. The coordinators were in communication with each other and had similar expectations about the level of curricular integration that should be reached in a learning community, but they generally worked independently at each campus to make decisions about how to enhance the learning community model and how to work with faculty.[7]

Faculty recruitment and training were the two other major responsibilities of the program coordinators at Houston. Faculty recruitment was a continuing process as the programs scaled up to serve more students. Working with department chairs, coordinators identified promising faculty and offered them the opportunity to teach in learning communities, as well as a small stipend (described in more detail in the cost section below). Several faculty members also came to the program out of their own interest or after learning more about learning communities. Faculty recruitment was generally eased by strong support from the lead administrators for instruction at each campus, who placed a priority on the project and encouraged buy-in among department chairs who were initially unsure about the model. However, new faculty were often recruited just before the semester began, leaving little time to be paired with a partner and develop linkages between the two courses in the learning communities. According to a faculty survey, the majority of learning community faculty (14 of 22 respondents) at Houston were temporary or adjunct employees.

There was wide variation in the training that faculty received once they had agreed to teach in the learning communities at each campus. The final campus to join the demonstration was the only one to create a systematic training plan for new faculty to develop the curricula and assignments for their learning communities[8] (see Table 5.1). At this campus, faculty

[6]Visher, Schneider, Wathington, and Collado (2010); Weissman et al. (2009); Asera (2008).

[7]The program coordinators also worked with counselors and other student services staff to coordinate student recruitment and study intake. These tasks were largely necessary because of the random assignment design of the study and had a minimal effect on the implementation of the program.

[8]This was implemented in their final semester of participation in the demonstration, based on recommendations from two experienced faculty members from another college who led a faculty development event at Houston. Faculty were eager to engage in a longer planning process during the summer if it meant avoiding problems that came up in the first semester of participation — class sizes were small because of problems relating to registration and study intake, making group work difficult, and the timeline left little time for faculty to meet and develop integrative assignments.

The Learning Communities Demonstration

Table 5.1

Houston Faculty Development Activities

Learning Communities for Students in Developmental Math

Summer 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Summer 2009	Fall 2009
Small faculty team attends Washington Center Summer Institute	Washington Center consultant observes nonstudy learning community classrooms, leads workshop with faculty at one campus	Washington Center consultant observes learning community classrooms, leads workshop with faculty at two campuses	Cross-campus faculty sharing event organized to introduce faculty at third campus to learning communi-ties	Retreat facilitated by experienced faculty members from another Achieving the Dream college; experienced and interested faculty invited	Regular meetings facilitated by coordinators for faculty to plan their upcoming learning communities (one campus only)	No faculty development activities

SOURCE: MDRC field research.

selected their teaching partners at the initial meeting after a group discussion about classroom management styles; over the course of several weeks in the summer, these pairs met regularly with each other and with the coordinators to develop joint assignments and integrated syllabi for their learning communities. The coordinators spoke highly of this process, saying that it was essential for providing a framework for faculty without being overly prescriptive.

The value of a systematic training process is underscored by the frustrations expressed by faculty at another campus, where provisions were not made for group or pair planning time. Expectations for learning community faculty were conveyed in one-off faculty development events or informal conversations between the coordinator and faculty members, and faculty were expected to find time subsequently to work together to plan their courses. By the end of the demonstration, several experienced faculty members were acutely aware of the extra work required to develop their links and believed that it would have benefited them to have a forum to share strategies and assignments across courses rather than figuring things out individually.

How Did Students Get into the Learning Communities?

When first-time students come to register for classes at Houston campuses, they are required to take an assessment test to determine whether they are prepared for college-level work. During the study period, students at the three participating campuses whose math scores directed them to Math I were identified as eligible for learning communities when they spoke with a counselor or other college staff member about their registration options after taking the assessment test, as all new students were expected to do. Eligible students were informed briefly about the opportunity to participate in the study; they were also told that participation was voluntary. Students who expressed interest were told what the learning communities had to offer, how they differed from the regular services available, and the benefits and risks of participation in a random assignment research study. College staff were on hand to explain that participation in the study was completely voluntary and to answer any questions.

Students who were interested in participating in the study then signed an informed consent form to indicate that they understood the rights and responsibilities of participation in the study and completed a short survey on their background characteristics (the results of this survey are presented in Table 2.4). A computer program was then used to randomly assign each student to either the program or control group. College staff then helped program group students register for learning communities and any other courses they were interested in and helped control group students register for any courses they were interested in, other than learning communities. Program group students were strongly encouraged to enroll in the learning communities, while control group students were told that developmental math was recommended but not necessary; the student success course was required for all students. All students were

given a small gift certificate at the end of the study intake process to compensate them for the time spent learning about the study and completing forms.

The study intake process was designed to maximize the number of eligible students who had an opportunity to participate in the study. Given the number of steps and the possibility of human error, particularly during peak registration times, it is likely that some students were missed; there were also some students who chose not to participate. Nevertheless, thanks to the hard work of many staff members at Houston, the research team felt confident that the 1,273 students who came into the sample over the four semesters of study intake are representative of the developmental math population at the college.

How Comprehensive Were the Learning Communities at Houston?

There are several key components of comprehensive, robustly implemented learning communities designed to create an enhanced teaching and learning environment.[9] First, student engagement is theorized to result from the relationships that students develop with individuals on campus, from peers to faculty to support staff. Because co-enrollment in learning communities creates strong relationships among members of student cohorts, and learning communities can also encourage strong relationships between students and faculty, student engagement is a primary focus of much of the research on learning communities.[10]

Curricular integration and active-learning pedagogies are the two instructional strategies considered to be key elements of learning communities. Curricular integration is at the heart of the difference between linked and stand-alone courses and relies on faculty collaboration, a third element of comprehensive learning communities. Faculty teaching partners in learning communities can be aware of each other's course content and timing and can design lessons together to reinforce learning in both courses — a practice that is highly unusual in the community college setting outside of learning communities. Pedagogies that encourage active learning, in contrast, are by no means limited to learning communities. They are associated with learning communities because the course structure is meant to create a student-centered classroom, and active learning — in which students engage with the materials and each other to generate their own understanding of the subjects — is central to the best practices in student-centered instruction. Finally, comprehensive learning communities create connections to student support

[9]Visher, Schneider, Wathington, and Collado (2010).
[10]Tinto (1997).

services available on campus, in order to ensure that participating students have all the assistance they need to reach their academic and personal goals.[11]

At Houston, expectations increased over time for faculty to integrate their courses and collaborate regularly; co-enrollment and the connection to support services were included in the model from the beginning. Faculty practice, bolstered by professional development activities, responded to the heightened expectations. As a result, the program grew to be more comprehensive over the course of the demonstration, though it remained relatively basic overall when compared with the most robust learning communities as described in the literature. This section describes in detail the extent to which each of the components of comprehensive learning communities was implemented at Houston.

Student Engagement

At Houston, there was consistent evidence that the learning communities had positive effects for students in developing relationships with their learning community classmates; evidence on the relationships between students and learning community faculty was much more limited, though there were some reports of benefits that could be attributed to the course structure.

Relationships Among Students

Throughout the course of the demonstration, students and faculty reported that students developed strong bonds within their learning community courses and compared these bonds favorably with the relationships they had or had observed in courses outside of learning communities. Both students and faculty believed that seeing and working with the same group of students in two classes allowed students to develop academic and personal support networks that increased their chances of success. For instance, many students in the learning communities stated that they knew the classmates in their learning community better than those in their stand-alone classes, and that these relationships helped them feel more comfortable speaking up in class and reaching out to their classmates for help. "We can participate more because we're comfortable with each other," said one student in a focus group. Others agreed: "I like the part where we get to be in the same classes together," said one student. She continued, "If one of us needs help, we can go to the other students, and they might know how to do it. And since we already know each other, we're not gonna be, like, shy not to talk to each other."

Several students told stories of studying together outside of class: "We learn from each other. [Two of us] meet up before and go to lab and do our assignments together and help each other get it, until the point where we can call on each other if we have a problem…that's a big

[11] Visher, Schneider, Wathington, and Collado (2010).

advantage." They also helped each other outside of study groups, sharing information with faculty about absent students and making sure that students who missed class were up-to-date on assignments. Many students made it clear that these relationships were distinctly different from their classes outside of learning communities: "My classes over there — we don't communicate and hang as much as we do in this class.…She texts me when we have something going on." All in all, learning communities students reported feeling supported by their peers and were clearly invested in one another's success.

Faculty members were similarly positive about the advantages of the cohorts in creating an environment of mutual support among their students. They described a classroom environment in which students helped each other with their work and tended to know what was going on when a student was absent or running late. In contrast to stand-alone classes, a faculty member described the comfortable classroom environment that developed as a result of the learning communities: "The students are [in stand-alone classes] as isolated little vacuums. A lot of them afraid, insecure.…In the learning communities — because from the very beginning you're cultivating this consciousness that you're a group, you're going to work together, you're going to help each other, everybody almost from the very beginning relaxes more." Another experienced faculty member shared that a group of her learning community students had registered together for courses in the following semester so they could "continue as a team to be successful."

Learning community faculty also believed that cohort membership led their students to be more disciplined and responsible, because they held each other accountable for their work. In a particularly impressive anecdote, one faculty member described how his student success class convened on a day when he told them he was going to be absent; his students took attendance and split up into groups to work on an ongoing project. He attributed this group-oriented attitude directly to the learning community; while he had used similar techniques to build relationships among students in his stand-alone sections of the student success course, they did not serve to create the same bonds as in his learning community.

> I have everyone move around at least four times the first class day, to introduce each other, exchange numbers and e-mail addresses, and always sit by someone different until you accept that someone in class. That semester, you sat by somebody new every day. They developed this relationship, which is phenomenal. It's interesting. They relate to me in the classroom. It's unbelievable. In the regular [student success] class, I don't have that. They don't work together. They don't study. They don't read. They don't do anything, but with the learning community course, it's more like a family.

At least one faculty member, however, reflected on the potential downside of student cohorts as a result of some classroom management problems he had encountered in his learning community: "The strength of it is also the weakness; it makes them kind of get in their high

school thing because they happen to be together more than one class. That never happens with regular students…so now they've got three hours to work on being buddies, which turns them into little groups, which is a plus and a minus. The plus is the places where you have them work together, the minuses when you get those little groups and the hookups." The phenomenon of the student cohort reinforcing negative behavior, popularly known as "hyperbonding," can be a concern for learning community faculty. In this case, the faculty worked with the program coordinator, who came into the classroom as an external authority to impose discipline on the students who were causing trouble. This situation was also cited as one of the main reasons for the elevation of the dedicated counselor role on this campus, described below.

Relationships Between Students and Faculty

Proponents of learning communities believe that faculty members who share the same group of students can provide insight and support for each other about issues that their students may be facing; moreover, learning communities are meant to promote student-centered pedagogy, which can include greater faculty outreach and accessibility for students.12 However, in the Houston learning communities, relationships between students and faculty did not initially seem to differ greatly from those in stand-alone classes or those that control group students were exposed to, though there were scattered examples of enhanced relationships in the learning communities.

As the demonstration progressed, however, there was a stronger sense among some faculty that their collaboration with their teaching partners had led to stronger relationships with their shared students. For example, one math instructor enumerated the problems of several of his failing students, such as technology phobia and conflicts with work. He noted that while these problems were similar to those that any student might face, he knew the details only because they were learning community students. The same instructor also found himself willing to go further to help his developmental students as a result of the energy and commitment of his student success teaching partner: "I was very fortunate to work with somebody who's got a lot more juice energy-wise because I'm developmental math and at some point, I say, 'Look, I gotta put this out here but you have to come get it.' With the learning community, I still set that same tone but you find yourself saying, 'Okay, let me try to reach just a little bit further.' " Several other instructors also expressed that their pedagogy or attitude toward students had been affected positively by their teaching partner.

[12]Visher, Schneider, Wathington, and Collado (2010).

Faculty Collaboration

In addition to facilitating community among students, learning communities are designed to counteract the isolation that many community college faculty experience as they plan their courses and go through a semester of teaching. In contrast to typical practice, learning community faculty are expected to collaborate with each other on two fronts: coordinating their syllabi to provide substantive links between students' learning in each course and discussing shared students to gain greater insight about the best ways to teach and support them.[13]

At Houston, the level of collaboration between faculty members varied greatly, from teaching partners who communicated regularly both before and during the semester, to at least one pair who never discussed their learning community. Faculty members who were paired just before the beginning of the semester collaborated less frequently than those who had more time to plan or who had worked together in a learning community before. Overall, however, discussions in faculty focus groups made it clear that there was an increase in collaboration as standards for curricular integration changed over the course of the demonstration: As the coordinators became clearer about their expectations and faculty commitment to the model deepened, teaching partners tended to work together more.

No matter their level of collaboration on curricular integration, faculty reported that most of their conversations — either in person or by e-mail — were about their shared students and their students' problems in or outside of the classroom, rather than about coordinating their course content. On a faculty survey, nearly all (21 of 22) learning community faculty members reported communicating with other faculty about shared students; interestingly, this was also done by about three-quarters (33 of 43) of non-learning community faculty. Attendance and test performance were the topics most frequently discussed among learning community faculty, and faculty seemed to appreciate the insight their partners were able to provide as a result of teaching the same students.

Curricular Integration

Curricular integration, in which the content and assignments of the two courses are linked, is a key element of learning communities. Unlike student cohorts, which are simply created by co-enrollment, curricular integration cannot exist without coordination and planning by faculty. And before this hard work can occur, faculty must be paired as teaching partners,

[13]Learning community faculty can also come together in a larger group to create a "community of practice" around teaching in linked courses. This can include mutual reflection, feedback, and brainstorming on best practices in pedagogy, creating joint assignments, and working in teaching pairs (Grubb, 1999; Engstrom, 2008). At Houston, this was most evident at the campus where a systematic training system was implemented; interestingly, it also arose between math faculty members at another campus.

be made aware of the program's expectations for curricular integration, and be given the time and the tools to meet these expectations. These conditions were not always met at Houston, particularly at the beginning of the demonstration at each campus, though informal linkages, where faculty members referenced the other course or instructor, were present throughout the demonstration.

When the demonstration began, the coordinators were more focused on challenges related to scaling up the program; faculty were told that they should create assignments that would link the Math I and student success courses, but were given little guidance and not held accountable for their syllabi. By the final semesters of the demonstration, however, expectations for the learning communities at each of the campuses included a higher level of curricular integration, though still one that was quite basic. Faculty were asked to include at least three integrated assignments across the Math I and student success courses, a guideline that the coordinators developed over time as processes for student and faculty recruitment became smoother.

In the latter half of the demonstration, the coordinators had learned more about the kind of teaching and learning that greater levels of curricular integration make possible, and faculty were also personally more committed to incorporating integration because they had spent more time teaching in learning communities and had become comfortable with the linked course structure. At the beginning of the demonstration, faculty had included very few or no joint assignments in their learning communities; by the final semesters, most faculty pairs were including at least three joint assignments across their courses. It is important to remember, however, that these assignments and linkages did not change every aspect of teaching and learning in learning community classrooms; on many days, faculty taught as they would in a normal, stand-alone version of their Math I or student success course.

Some noteworthy examples of integrated assignments, as described by the Houston learning community faculty, include a student success lesson about math anxiety and test-taking — timed to coincide with the students' first math test — and goal-setting projects in the student success course that incorporate math skills, such as tracking calories or creating a time-planning log for personal organization. Faculty also created career planning projects in both courses. In the student success course, students researched salaries for their career options and created budgets based on these salaries; the math project involved interviewing a professional in a desired field about the ways he or she uses five basic math concepts in daily work.

Finally, one teaching pair developed a home-purchasing project that underscored the math skills needed to meet this real-life goal. For the learning community's field trip, the class went out to lunch and then to a real estate developer's showroom. Groups of students worked together to choose a home to purchase with an assigned budget, taking into account calculations of taxes, mortgages, and other costs. The program coordinator underscored the value of the

home-purchasing assignment by describing the ways that knowledge acquired during the project could benefit students in the future, as well as in both of the courses in the learning community: "Because many of our students are not even thinking about buying a home, or that it's possible, or that there's a connection between being able to figure these things out, the skills you're learning in a math class [you are]…then taking it to a real life situation."

In addition to what faculty reported in focus groups, analyses of syllabi from learning community courses indicate that there was growth in curricular integration. The syllabi were evaluated to assess the extent to which they included references to learning communities and practices commonly associated with learning communities, such as joint assignments and themed curriculum; a higher score reflects a greater number of references and thus a greater likelihood that the core components of learning communities were implemented in those courses. As can be seen in Figure 5.1, the score for practices associated with linking and integration increased over the course of the demonstration, with an average of three more references appearing in syllabi in the final semester compared with the first semester. (Appendix Table A.6 provides more detailed results from the syllabi analysis.)

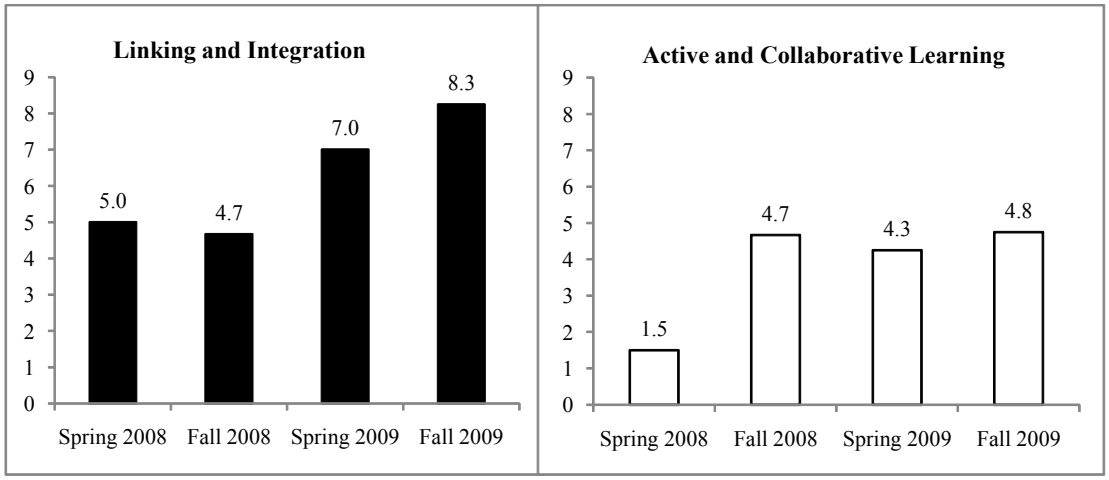
The collaboration between learning community faculty at Houston provided the underpinnings for many of the curricular linkages between the Math I and student success courses, though in some cases faculty members worked on their own to figure out how to connect material from both courses. On the faculty survey, the majority of faculty (16 of 22) reported collaborating about syllabi or assignments more than twice a semester. Interestingly, several faculty members and coordinators said that they believed the weight of integration should fall on the student success faculty, because their course is more flexible than Math I and because math instructors are more stubborn and stuck in their ways than other faculty.

While some student success faculty resented this expectation, it seems to have been borne out in practice. The majority of the integrated assignments described above took place in the student success course, and students in focus groups generally had an easier time coming up with examples of the way their student success course helped them in math, rather than vice versa. For example, one student said that what she was learning in the student success class "really helps me control my time management [and] not to get frustrated and take good notes and stuff." Other students said that the studying and note-taking techniques they learned in the student success class had been helpful in their Math I class. Informal linkages also occurred as student success faculty used Math I as a known example to discuss discipline and appropriate college behavior, a major goal of the course. As one faculty member put it: "My emphasis as far as the role of math is more not so much the math skills as it is appropriate behavior in a classroom setting, period, whether it's a math class or any class, and just trying to hone in on improvement in those skill areas."

Figure 5.1

Houston: Average Scores on Two Dimensions from an Assessment of Learning Community Syllabi Spring 2008-Fall 2009

Learning Communities for Students in Developmental Math



SOURCE: MDRC calculations using syllabi collected from learning communities at Houston Community College.

NOTES: Syllabi were evaluated using a rubric to calculate the number of references made to three key dimensions: references to learning communities, references to use of integrated curriculum, and references to use of active and collaborative instruction. References to learning communities and to the use of integrated curriculum are collapsed into the category "Linking and Integration." For a full list of the indicators in each dimension, see Appendix Table A.6.

Results are based on evaluations of two syllabus sets from learning communities in the spring 2008 semester, three syllabus sets from learning communities in the fall 2008 semester, four syllabus sets from learning communities in the spring 2009 semester, and four syllabus sets from the fall 2009 semester. The total of 13 syllabus sets represents 45 percent of all syllabi in use by learning communities at Houston Community College across the four semesters.

Perhaps because curricular integration was a piecemeal effort in many learning communities, however, students in focus groups had mixed reactions to their experiences. Students in one learning community shared that both of their instructors knew what section was being covered in the other class and tried to relate examples and use terms that were familiar from what they were studying. One explained, "It's easier to remember when they're both relating to each other." In contrast, students in other learning communities said that they did not see the connections between their courses and expressed doubt about the possibility of connecting the subject matter. Several faculty members — those whose classes seemed to include less integration — also said that they did not think students saw many connections between the two classes.

Active Learning

Pedagogy that encouraged active learning was less a focus than curricular integration for the program coordinators and faculty at Houston. Group work was the main active learning strategy that faculty in learning communities spoke about using. In both the Math I and student success courses, faculty felt that groups encouraged students to work together and help each other on small assignments, such as developing time management skills or semester-long projects on career choices, as well as giving each other feedback and making assignments more fun. Several faculty members also spoke about the ways the relationships that developed as a result of the cohort helped create more comfortable and positive interactions during group work than these faculty had witnessed in their stand-alone courses. The syllabi analysis (shown in Figure 5.1 and Appendix Table A.6) looked for indications of active learning strategies and saw growth between the first and second semesters but relatively little variation thereafter.

Field trips were a unique strategy for active learning outside the learning community classrooms. Each class went on one field trip each semester to a destination chosen jointly by the coordinator and the faculty members.[14] Curricular integration was often the backbone of the active learning opportunities created by the field trips; for example, for a trip to the art museum, students in one learning community were asked to look for geometric shapes in the paintings, consider ratios and measurement, and then write a paper on what they saw. Several faculty members also attributed the field trips to building comfort levels for students and, in turn, helping encourage retention. A math instructor talked about the bonds between students, saying, "When people get together, and they're comfortable with each other, and they interact with each other, and they go on a field trip together, I think it…makes a big difference on the persistence and whether they come back to you next semester." Additionally, several faculty members commented that the field trips they took with their learning community students offered a rare opportunity to connect. One student success faculty member said, "The students have an opportunity and [my teaching partner] has an opportunity, as I do, to interact with the students on other levels other than just being in the classroom."

Connection to Support Services

Learning communities can become enhanced learning experiences through means other than curricular integration and active learning. Each coordinator made the decision to include a different connection to support services in the model; each of these connections evolved over time, in reaction to lessons learned during implementation. At one campus, the learning com-

[14]Several faculty members noted not only that field trips were a special part of the learning communities curriculum, but also that the particular structure of the learning communities made field trips possible. Block scheduling provided three hours of time for faculty and students to travel downtown and visit a museum; extra funding for the program made it possible to rent a bus and provide lunch for the students.

munities included a tutoring component. Initially, there was a dedicated tutor for the learning communities whom faculty chose to use in various ways. Some faculty members used class time to send students to the tutor, others assigned a grade for seeing the tutor outside of class, and others did not use the tutor at all. By the final semester of the demonstration, the idea of the dedicated tutor had been dropped, but all learning community faculty continued to be strongly encouraged to include participation in tutoring as part of the grading for their course.

At a second campus, there was a dedicated counselor for the learning communities, who attended the first day of the learning community to introduce herself as a resource and to make a presentation about other resources available on campus. The counselor worked closely with faculty members in each learning community to address attendance problems or tutoring needs and develop degree plans for students, among other tasks. For example, one math faculty member realized that several of his students were in need of tutoring; the counselor worked with the students to coordinate times and locations for meeting with the tutor.

At the third campus, resources at the college allowed faculty to create a different learning environment for program group students by including technology in several learning communities. For example, one math instructor created a set of online videos and PowerPoint presentations, which he incorporated into his lessons and made available online. His teaching partner also used the videos in her student success course to reference work that students were doing in the math class. Additionally, the coordinator at this campus was able to use grant money to purchase iPod touch devices for the students in two learning community classes.[15] Students were encouraged to access math instructional videos on the devices and to use them for a regular blogging assignment for the learning community; the devices were also integrated with a library orientation to introduce students to the idea of using mobile devices for research. Unfortunately, while the iPod touch certainly provided an exciting perk for learning community students, both faculty and students faced a technological learning curve when it came to using it successfully to support work in the classroom

The Cost of Running Learning Communities at Houston

As would be expected, colleges must expend more resources than are typically spent on nonlinked courses in order to offer students learning communities. It is natural to assess the merits of these learning communities by asking what they cost to operate and whether the amount spent was a worthy investment. To this end, this section uses data from the final semester of the demonstration to offer insight on what it cost Houston to offer its students basic developmental math learning communities. Additionally, there are short discussions on funding sources and on the context of these costs.

[15]The iPod touch is the new generation of iPod, which has a touch screen and a wireless connection.

Cost Components and Findings

Table 5.2 shows the estimated net cost of operating learning communities for students in developmental math at Houston during the final semester of the demonstration (fall 2009), when the program at each campus was in at least its second semester of operation.[16] During this semester, 329 students enrolled in 13 learning communities across the three campuses, taught by 23 faculty members. The estimates are presented as aggregates in the top panel of the table and per program group member in the lower panel. The latter is consistent with the impact estimates presented in Chapter 6, which are also considered per program group member. The cost data for each of the three campuses studied in Houston are presented separately because each campus chose to use its program funds differently; for example, in the ways it compensated faculty and staff. In interpreting Table 5.2, it is important to recognize that because the costs that have been estimated are small, any inaccuracy in the cost information received from the three campuses could cause a large increase or decrease in the estimated costs in percentage terms.

In the Houston learning communities, faculty received stipends for the time they spent preparing for learning communities in advance of the semester and for the additional time and effort they expended during the semester to teach in the learning communities setting. As shown in Table 5.2, each of the three campuses in Houston gave faculty members a different stipend for teaching in learning communities, while one campus also provided a stipend for faculty who were developing a new learning community. In the fall 2009 semester, the Northline campus gave its 12 learning communities instructors each a $200 stipend, while Southeast campus gave its seven instructors each a $400 stipend. Central campus not only gave its four instructors each a $300 stipend, but also gave faculty teaching together for the first time an additional stipend of $200. Averaged across students, the total cost of faculty stipends per program group member was $22.

Additionally, full-time faculty at Northline who were new to teaching learning communities also received a one-course reduction, or "release time," during the semester before they taught in the learning community. This release time was granted in order to develop plans and prepare to teach in the learning community, and its cost is calculated as the cost of hiring an adjunct instructor to teach the course instead of a full-time instructor. Though this expense may have been greater in previous semesters, in fall 2009 the learning community faculty roster included only one new full-time faculty member. The "Additional Faculty Salary" section in Table 5.2 reflects the cost of the faculty member who received this compensation: $3,154, or $10 per program group member, including associated fringe benefits and overhead.

The three campus coordinators at Houston were all faculty members who each received release time for their coordination role, calculated at the rate described above. The resulting cost

[16]As stated in Chapter 2, cost data for Houston's learning communities were gathered primarily by interviewing coordinators and examining expenditure reports.

The Learning Communities Demonstration

Table 5.2

Houston Community College Learning Communities: Estimated Net Aggregate and per Program Member Costs During the Fall 2009 Semester

Learning Communities for Students in Developmental Math

	Aggregate			
Learning Communities Cost Component ($)	Total	Northline	Southeast	Central
Faculty stipends[a]	7,200	2,400	2,800	2,000
Additional faculty salary[b]	3,154	3,154	0	0
Coordinator salary[c]	9,461	3,154	3,154	3,154
Staff stipends	3,300	200	400	2,700
Lead Coordinator stipend	1,900	0.00	400	1,500
Math Dept. Chair stipend	200	0.00	0	200
Guided Studies Dept. Chair stipend	200	0.00	0	200
Counselor visiting class stipend	1,000	200	0	800
Faculty/counselor development	6,816	2,848	2,381	1,587
Student services	26,551	13,276	9,235	4,040
Outings and special events	2,050	650	100	1,300
Equipment and material	7,907	675	6,068	1,164
Total aggregate cost	**66,439**	**26,348**	**24,138**	**15,945**

(continued)

Table 5.2 (continued)

Learning Communities Cost Component ($)	Cost per Program Group Member			
	Total	Northline	Southeast	Central
Faculty stipends	22	16	26	27
Additional faculty salary	10	21	0	0
Coordinator salary	29	21	29	42
Staff stipends	10	1	4	36
Faculty/counselor development	21	20	22	21
Student services[d]	81	92	86	54
Outings and special events	6	5	1	17
Equipment and materials	24	5	56	16
Total cost per program group member	**203**	**181**	**224**	**213**

SOURCE: MDRC calculations from fall 2009 cost data provided by Northline, Southeast, and Central Community Colleges.

NOTES: [a]Faculty stipends were given at a rate of $200 at Northline to 12 faculty, $400 at Southeast to 7 faculty, and $300 at Central to 4 faculty. In addition, Central offered an additional stipend of $200 to each of the 4 faculty for Link Development.

[b]New full-time faculty teaching learning communities at North Line were offered a release time of one class (3 credit hours) per semester. Faculty release time is calculated the same as coordinator release time. In the fall 2009 semester there was only one new faculty member at Northline who received the release time.

[c]Coordinators (who are faculty) were offered a release time of one class (3 credit hours) per semester. It is assumed that release time will be covered by an adjunct, at a rate of $2,190 per class. Total coordinator salary cost was calculated as adjunct rate of one class plus 11% fringe benefit and 33% overhead.

[d]In making these calculations, it was assumed that a session with a tutor or a counselor averages one hour in length. Tutors and counselors receive $19.50 per hour, on average. It was further assumed that program group members who did not actually enroll in learning communities did not receive any additional tutoring or counseling as a result of learning communities. Thus, to make the calculations, the number of additional tutoring and counseling sessions estimated to have resulted from learning communities was multiplied by $19.50. This figure was then multiplied by the number of students enrolled in learning communities at each campus and divided by the total number of persons in the program group at each campus.

for coordinators' release time was $3,154 for each coordinator, or $29 per program group member, slightly less than the per-student cost of faculty stipends and additional salary.

Each campus had a different approach to compensating other staff with stipends. Southeast and Central paid their coordinators a stipend in addition to a one-course release time, while Northline and Central paid stipends to counselors who visited the learning communities classes. Central also gave department chairs a stipend for assisting in recruiting faculty. The average cost per program group member of these various "Staff Stipends" was $10.

Another type of expense for learning communities at Houston was faculty development costs. During summer 2009, Houston invested in the faculty and staff involved in learning communities by providing opportunities to travel to conferences in order to build the college's capacity for teaching and operating learning communities. In previous semesters, Houston also brought consultants to the college to conduct workshops about learning communities implementation. Counting the travel costs toward the program total in the fall 2009 semester, the cost of faculty development was $6,816 — $21 per program group member.

As mentioned above, Houston included outings and special events for their learning communities students as an enhancement to the classroom experience. These outings and events cost about $6 per program group member.

A final cost to the college was generated by an increased use of student services among learning community students. A short student survey showed that learning community students participated more in math tutoring, general tutoring, and counseling than they would have without the program. The cost of the staff time required to meet this increased demand was estimated to be $81 per student. Nearly half of this per-student cost went to math tutoring, while general tutoring and counseling each comprised roughly one-fourth of the total cost. This additional cost should be seen as separate from the direct program costs in the current analysis, because college funds that were already earmarked for this purpose covered the services. However, these costs do reflect the growing demand for the services that arose from the program and imply that these services may need to be expanded in the future if the program is scaled up.

In total, learning communities at Houston cost the college an additional $203 per student more than the standard college expenditures for students in developmental math. About $120 of this was for program components and an additional $80 was for the increased use of student services outside of the learning communities.

Considering Funding Sources

Funding for the costs listed above came from two major sources: Achieving the Dream, which supported direct program costs, and college funds, which paid for the student

support services. (College funds also paid for faculty class time, which was not included in the calculations above, because the cost to the college would have been the same if those faculty members had been teaching in stand-alone courses rather than in learning communities). This underscores the important role that external grant funds can play in supporting innovative programs. As the demonstration came to an end, however, Houston had to grapple with the question of how to continue to support the program. This section briefly covers some of the solutions the college developed.

Faculty stipends are the cost component the college found most difficult to cover in the absence of outside funding. As opposed to teaching time, which is funded by existing college funding sources, the stipends for learning communities instructors at Houston required external or special funds. Campuses that were able to maintain their learning communities beyond the fall 2009 semester used external grant funds to support stipends for instructors teaching in learning communities. Houston was not alone in feeling the weight of paying for faculty stipends to support learning communities. For example, in a program that provides several California community colleges with funds to support student success initiatives, the largest single expense for most of the colleges implementing learning communities was found to be faculty stipends.[17]

As with faculty stipends, external grants or other special funds are required to cover the expense of staff stipends. Even at $10 per program group member, administrators at some of the campuses indicated that providing stipends to staff to support learning communities was too large an expense in the absence of external funding, given budget constraints.

While it may be difficult to find funding to cover some types of faculty development, such as consultant fees and conference attendance, Houston began exploring new ways to incorporate some of the faculty development costs into its internal budget. In order to prepare new faculty and support returning learning community faculty, Houston has begun offering a course on teaching learning communities at its Center for Teaching and Learning Excellence. However, beyond this single course, the college has not been able to invest additional resources in faculty development for learning communities.

Houston also found creative ways to continue funding for field trips in the absence of a budget line from the college or external grant funds. The coordinator at Northline submitted a proposal to the student activities council, a student board that decides on funding allocations for student activities, and received the funding needed to cover the cost of the learning com-

[17]See Weissman et al. (2009) for detailed program costs by component for learning communities at two community colleges and an overview of faculty compensation for learning communities instructors at five California community colleges.

munities outing. The coordinator at Northline was also investigating the possibility of creating a learning communities cultural group, which could have a standing budget and receive recurring funds from the student activities council, rather than the one-time funding it received for a theater outing.

The Costs of Houston's Learning Communities in Context

While there is little hard data on the costs of learning communities at other community colleges around the nation, the total per-student cost of about $120 in program costs plus about $80 in additional student service usage is — on the surface — not particularly high for a semester-long program that encompasses two classes. To give this finding some context, a recent analysis of national postsecondary education expenditures estimates that community colleges spend an average of about $12,000 per year to educate each full-time student (including about $5,000 per year on direct instruction, $1,000 on academic support services, and the rest on other services and administration).[18] This means that the per-student program cost of $120 represents a 1 percent increase on top of the typical cost of instruction and a small proportion of total spending at community colleges.

How the Learning Community Experience Differed from Regular Services for Students in Need of Developmental Math

While there was variation between the implementation of the learning communities at each of the campuses, it is true across the board that the students who enrolled in them were exposed to a different teaching and learning environment, when compared with the experiences of their counterparts who enrolled in stand-alone versions of the same classes (see Table 5.3). The learning community structure itself was a major factor contributing to these differences, as the linked courses influenced enrollment patterns and created student cohorts. Faculty practices, as shaped by the expectations and training the coordinators provided and the decisions individual faculty members made, were the other significant differentiating factors.[19]

Students randomly assigned to the learning communities program group, compared with those assigned to the control group, chose to take different courses during the program semester. Both groups registered for courses at a similar rate, with over 80 percent of each group still enrolled by the college's census date (see Table 5.4). However, while nearly all of

[18]Desroches, Lenthan, and Wellman (2010).

[19]A limited number of students in the control group faced an additional difference: Scheduling constraints meant that all of the Math I courses offered at one of the campuses took place in the math lab rather than a traditional classroom. In lab classes, students work through lessons on the computer and have access to a faculty member, but there is no lecture or discussions.

The Learning Communities Demonstration

Table 5.3

Program Differential at Houston

Learning Communities for Students in Developmental Math

Program Feature	Learning Communities Program	Regular College Services
Curricular integration	• Courses include at least three integrated assignments • Informal links between student success skills and math learning • Minimal at start of demonstration, increased over time	• Informal, at the discretion of faculty members. Faculty survey responses imply that this practice is not uncommon among non-learning community faculty. • Limited, since students not all taking the same classes together
Faculty collaboration	• Teaching pairs collaborate to support shared students • Some time spent planning linked assignments and projects. • Minimal at start of demonstration, increased over time	• Informal, at the discretion of faculty members. Faculty survey responses imply that this practice is not uncommon among non-learning community faculty.
Active learning	• Faculty assign group work and encourage discussion • Learning communities go on a field trip each semester	• Limited information on control faculty's use of active learning strategies
Student engagement	• Students created academic and personal support networks within courses as a result of student cohorts • Students had open, supportive relationships with faculty; some evidence that this was reinforced by faculty collaboration	• Students formed fewer close relationships with peers within courses • Students had open, supportive relationships with faculty
Connection to student support services	• Some learning communities integrate tutoring; others have a dedicated counselor • The student success course provides information about services available on campus • Access of services depends on students' needs	• The student success course provides information about services available on campus, including a presentation by a counselor • Access of services depends on students' needs

SOURCE: MDRC field research.

The Learning Communities Demonstration

Table 5.4

Houston Course-Taking Patterns, Program Semester

Learning Communities for Students in Developmental Math

Outcome (%)	Program Group	Control Group	Difference (Impact)	Standard Error
Program semester				
Registered for any courses	84.2	81.2	3.1	2.9
Enrolled in a learning community	71.0	1.5	69.5 ***	3.7
Attempted any developmental math[a]	80.3	72.3	8.0 **	3.4
Attempted Fundamentals of Mathematics I	77.1	68.0	9.1 **	3.8
Attempted Fundamentals of Mathematics II	3.4	3.7	-0.4	1.4
Attempted College and Career Planning course (%)	80.1	73.3	6.7 **	3.4
Sample size (total = 1,273)	761	512		

SOURCE: MDRC calculations from Houston Community College transcript data.

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

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

The probability of being assigned to the treatment group varies within cohorts, and estimates are weighted to account for the different random assignment ratios. Standard errors are clustered by learning community link.

Estimates are adjusted by cohort, campus, and score on the pre-algebra placement test at baseline.

All measures are based on courses that sample members are still enrolled in at the end of the add/drop period.

[a]Includes MATH 0101, MATH 0102, MATH 0106, MATH 0108, MATH 0112, MATH 0306, MATH 0308, MATH 0312. The percentage of students attempting any developmental math course may be less than the sum of students attempting either MATH 306 (Fundamentals of Mathematics I) or MATH 308 (Fundamentals of Mathematics II) because some students enrolled in both MATH 306 and MATH 308.

the learning community students enrolled in Math I, control group students enrolled in this course at a lower rate. A similarly low rate was evident for enrollment in the student success class; these differences were both statistically significant. These enrollment numbers demonstrate success in fulfilling the administration's goal of using the learning communities to encourage earlier enrollment in developmental math.[20]

[20]After students were assigned to the learning community group in the study intake process, they were told that they were required to sign up for a learning community. This could imply that it was the required nature of the courses that led to the higher enrollment rates, rather than the learning communities structure itself. Two facts belie this conclusion: First, control students registered at a significantly lower rate for the student success course, which was required of all students according to college policy. Second, student transcript data presented in Chapter 6 show that there was a group of program group students who attempted developmental math

(continued)

The biggest qualitative difference reported by students was being a member of a cohort that co-enrolled in a learning community; this facilitated high levels of student engagement because students were able get to know one another and support one another academically in both courses. As described above, both student and faculty involved in learning communities compared the relationships among students favorably to those among students in stand-alone courses. Results of a short student survey provide another comparative perspective on student engagement and valuation of the learning community experience. In response to questions about life satisfaction and self-esteem, there were no significant differences on these measures between learning community students and non-learning community students who were taught by the same faculty member. On average, however, learning community students surveyed reported that they would pay an additional $40 in tuition in order to participate in a learning community. Thus, despite the concerns a few faculty members expressed about "hyperbonding," faculty and students overall spoke positively about the academic and personal support networks that were created by co-enrollment, and this remained a salient feature of the learning communities throughout the demonstration.

As a result of increases in faculty collaboration and curricular integration, the learning experience in the linked courses also grew increasingly different from that in stand-alone courses. In their student success courses, learning community students relied on their newly minted math knowledge to create budgets, make good eating choices, and manage their time well to balance studying and work. In the Math I courses, they were expected to apply their knowledge about the best ways to study and succeed in college in order to learn about fractions, decimals, and percentages on their homework assignments and tests. Compared with the elements of comprehensive learning communities set forth in the theoretical literature, however, curricular integration in Houston's learning communities remained minimal; other than in select assignments, coursework, and lessons, the Math I and student success courses tended to be limited to the typical curriculum.

Finally, the learning communities offered enhancements to the students' college experience through field trips and increased connections to support services. Field trips provided opportunities to develop bonds among students and faculty and to explore curricular integration in real-life contexts. Connections to support services were provided by the tutoring and counseling components added to the learning communities at two of the three campuses. Additionally, the curriculum in the student success course is designed to ensure that students are aware of the available resources on campuses. Because students in the program group

---

outside of the learning community structure; these may be students whose schedule did not allow them to take learning communities or who switched courses at some point during the semester. Even so, they chose to enroll in math, a sign that they had been impressed with the importance of taking developmental math right away.

enrolled in the student success course at a significantly higher rate, as a group they were more exposed to these support services.

As mentioned in the cost section above, there is evidence that the learning communities had a positive impact on students' use of the support services that were included in the enhancements. Results of a short student survey administered to a small group of learning community students and non-learning community students who were taught by the same faculty member provide evidence that the learning communities had a positive impact on use of the support services. Learning community students reported going to math tutoring at a significantly higher rate than non-learning community students; on average, learning community students used math tutoring five times during the semester, whereas non-learning community students used it only twice. Learning community students also accessed counseling at a significantly higher rate than non-learning community students.

Summary

There was variation in the implementation of the learning communities at Houston over time, as well as across campuses and within campuses. Overall, the learning communities strengthened over time, and co-enrollment was a consistently positive component. The strong ties that learning community students developed with each other by taking Math I and a student success course as a cohort created a different learning experience than that of their counterparts in the control group, who took these courses separately or not at all. Curricular integration between the two courses was a secondary difference; students who enrolled in learning communities in the latter half of the demonstration were exposed to more integrated assignments and learning experiences than those who enrolled earlier in the demonstration.

Chapter 6

Program Impacts on Educational Outcomes at Houston Community College

This chapter examines differences in educational outcomes at Houston Community College between developmental math students randomly assigned to participate in a learning community and those students randomly assigned to a control group. As described in earlier chapters, the theories of change for learning communities at Houston and Queensborough Community Colleges share many common elements and a central tenet: If learning communities can improve students' performance in developmental math, which is a key barrier to many students' successful progress toward a degree, then learning communities may also affect retention, credits earned, and, ultimately, graduation.

While the two demonstration sites share much in common, many of the specific elements of the programs are different, as described in Chapters 3 and 5. In particular, a single course — the lowest course in the developmental math sequence — was the focus of the learning communities at Houston. Further, the math course in the learning communities at Houston was linked with a student success course, rather than with college-level courses, as was the case for most of the learning communities at Queensborough. Finally, Houston's learning communities were implemented at three of the college's campuses, and the development of the learning communities over time differed across these campuses. This calls for a slightly different empirical method than that employed in the Queensborough analysis presented in Chapter 4 and is described below.

Key Impact Findings

- Learning community students were significantly more likely than control group students to pass developmental math in the program semester and to attempt — but not pass — the second math class in their sequence during the next semester.
- By the end of the first postprogram semester, control group members closed the gap somewhat, but learning communities students continued to maintain an advantage over their control group counterparts in passing the first math class in the sequence. Some of this progress in developmental math represents a substitution away from students taking developmental English courses in those semesters.

- On average, learning communities had no impact on the cumulative credits that students earned.
- Students in the learning communities group were no more likely to persist at the college than their control group counterparts.
- The impacts of the learning community at Houston were larger for those students who scored in the lower half of the math placement test in relation to other students in the course.

Research Methods

The methods used to calculate the estimated impacts of Houston's learning communities are very similar to those used to calculate the impacts for Queensborough and are described in detail in Chapter 4.[1]

Houston enrolled 1,273 students in the study between November 2007 and September 2009, at the Central, Northline, and Southeast campuses. As in the Queensborough chapter, outcomes are examined during the program semester, after the program ended, and cumulatively. At Houston, however, due to a later sample intake period, data are available only through the first postprogram semester for all of the cohorts, so the cumulative results show the difference between program and control group students at the end of the first postprogram semester.

Results for the Full Sample

Math Progression Measures

Math class outcomes, which were the primary short-term focus of the learning community, are presented in Table 6.1. (Box 4.1, presented in Chapter 4, describes how to read the

[1]The only difference in methods between Houston and Queensborough is that for Houston one needs to take into account that students' unobservable characteristics may be different across campuses as well as across cohorts. In addition to adjusting the impacts for cohort of entry, the Houston analysis adjusts for the campus site and interactions between cohort and campus. As in the Queensborough analysis, regressions are weighted to account for changes over time in the probability of being assigned to the program and control groups, and placement test scores on a pre-algebra test (COMPASS) are included in order to improve the precision of the estimates. Scores are missing for about 4 percent of the students; the scores for these students are imputed and a dummy variable indicating imputation is included in the regression. The standard errors are clustered at the learning community level to account for potential common shocks to performance among all members of a given learning community. The analyses presented here are "intent-to-treat" as for Queensborough. However, it is worth noting that, as shown later in Table 6.2, only 71.0 percent of the students assigned to a learning community actually enrolled in one.

The Learning Communities Demonstration

Table 6.1

Houston Transcript Outcomes, Math Progression

Learning Communities for Students in Developmental Math

Outcome (%)	Program Group	Control Group	Difference (Impact)	Standard Error
Program semester				
Fundamentals of Mathematics I				
Passed	53.9	40.2	13.8 ***	3.7
Attempted but did not pass	23.1	27.8	-4.7 *	2.8
Did not attempt	22.9	32.0	-9.1 **	3.8
College and Career Planning course				
Passed	59.2	52.8	6.4 *	3.6
Attempted but did not pass	20.9	20.5	0.3	2.6
Did not attempt	19.9	26.7	-6.7 **	3.4
First postprogram semester				
Fundamentals of Mathematics II				
Passed	14.9	12.2	2.8	2.0
Attempted but did not pass	22.2	17.0	5.2 **	2.6
Did not attempt	62.9	70.8	-8.0 ***	3.1
Cumulative[a]				
Any developmental math[b]				
Passed	60.1	50.3	9.8 ***	3.4
Attempted but did not pass	24.2	30.2	-6.0 **	2.7
Did not attempt	15.6	19.4	-3.8	2.9
Fundamentals of Mathematics I				
Passed	57.6	47.4	10.2 ***	3.6
Attempted but did not pass	22.3	27.8	-5.5 **	2.7
Did not attempt	20.1	24.8	-4.7	3.4
Fundamentals of Mathematics II				
Passed	17.8	15.5	2.3	2.1
Attempted but did not pass	23.5	18.4	5.1 *	2.6
Did not attempt	58.7	66.0	-7.4 **	3.0
College and Career Planning course				
Passed	63.3	60.5	2.8	3.4
Attempted but did not pass	20.3	18.6	1.7	2.4
Did not attempt	16.4	20.9	-4.6	3.0
Sample size (total = 1,273)	761	512		

(continued)

Table 6.1 (continued)

SOURCE: MDRC calculations from Houston Community College transcript data.

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

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

The probability of being assigned to the treatment group varies within cohorts, and estimates are weighted to account for the different random assignment ratios. Standard errors are clustered by learning community link.

Estimates are adjusted by cohort, campus, and score on the pre-algebra placement test at baseline.

All measures are based on courses that sample members are still enrolled in at the end of the add/drop period.

[a]Cumulative measures include courses taken from the program semester through the first postprogram semester, and include summer terms.

[b]Includes MATH 0101, MATH 0102, MATH 0106, MATH 0108, MATH 0112, MATH 0306, MATH 0308, MATH 0312. The percentage of students attempting any developmental math course may be less than the sum of students attempting either MATH 306 (Fundamentals of Mathematics I) or MATH 308 (Fundamentals of Mathematics II) because some students enrolled in both MATH 306 and MATH 308.

impact tables in this report.) Nearly all of the students participating in the study had placement test scores such that they were referred to Fundamentals of Mathematics I (Math I) during the program semester. In the first postprogram semester, students who continued on in their math sequence would have taken Fundamentals of Mathematics II (Math II).

The top panel of the table shows that program group students were statistically significantly more likely to attempt Math I in the program semester. The estimated impact of the learning community is that it increased the percentage of those who attempted (or in other words, decreased the percentage who did not attempt) Math I by 9.1 percentage points. That is a 28 percent drop in the fraction of students who ignored the college's advice to attempt Math I in their first semester. More importantly, the estimates show that the fraction of students who attempted and passed Math I increased (by 13.8 percentage points), and the fraction of students who attempted but *did not pass* declined (by 4.7 percentage points). Both of these estimated impacts are statistically significantly different from zero. Both of these findings are important, as they suggest that the learning community improved students' performance in the course, rather than simply nudging students who were capable of passing the course in any case to take it in the first semester. The estimated 13.8 percentage point impact on passing is substantial, implying that learning communities increased passing Math I by about 30 percent (over the control group's 40.2 percent).

In the postprogram semester, students in the program group were more likely to attempt the next class in the math sequence, Fundamentals of Math II. The estimated impact on "did not attempt" indicates that there was an 8.0 percentage point increase in attempts to take Math II for program group students compared with control group students. However, this increase in attempts resulted in an increase in both passing and failing to pass, although only the impact on failing to pass is statistically different from zero. In other words, program group students ended

the program semester more eligible than control group students to continue on to Math II. They were also apparently more willing to take Math II but were not more able to pass it.

If the learning community affects only the timing of when students take their courses, then one would expect control group students to close the gaps with program group students in subsequent semesters. The cumulative results suggest that, although the gaps in Math I performance closed somewhat, program group students continue to be more likely to have completed the Math I requirement. Knowing whether control group students' performance would catch up to program group students after another semester would require a longer follow-up period.

One might wonder whether the impacts of the learning community on math course outcomes are actually due to the programmatic components of a learning community or whether the impact would be similar if students were simply strongly urged to take a given math class in their first semester. There are two pieces of evidence that suggest that learning communities do more than simply shift the timing of math course attempts at Houston. First, as noted above, in addition to the pass rate increasing, the fraction of program group students who attempted Math I but did not pass it declined. This indicates a change in performance beyond a mechanical increase in pass rates linked to increased attempts.

A second insight into the impact of the learning community may be gleaned by considering the outcomes for the College and Career Planning course, also shown for the program semester in Table 6.1. It is Houston's policy to tell students to take this course in the first semester of their college careers, so both program and control group students received this advice from the college. However, the learning community students were 6.7 percentage points more likely than control group students to follow this guideline (the reduction in not attempting), and were 6.4 percentage points more likely to pass the course. This suggests that something more was achieved by the learning community than was achieved by the college merely exhorting students to take certain courses at certain times.

Persistence in College and Credit Accumulation

Table 6.2 presents the analysis of the learning community's impact on persistence at Houston and on credits attempted and earned. Program group students are no more likely than control group students to register for any given semester, indicating that the program had no impact on persistence at Houston.

During the program semester, there was no impact on total credits attempted or credits earned overall, or for regular or developmental courses. Since there was an increase in the probability that students passed Math I and thus earned more developmental math credits, the fact that there was no effect on total developmental credits earned may appear surprising at first

The Learning Communities Demonstration

Table 6.2

Houston Transcript Outcomes, Credit and Persistence Measures

Learning Communities for Students in Developmental Math

Outcome	Program Group	Control Group	Difference (Impact)	Standard Error
Program semester				
Registered for any courses (%)	84.2	81.2	3.1	2.9
Enrolled in a learning community (%)	71.0	1.5	69.5 ***	3.7
Number of credits attempted	7.8	7.8	0.1	0.3
Regular credits	3.3	3.5	-0.1	0.2
Developmental credits	4.5	4.3	0.2	0.2
Number of credits earned	5.3	5.2	0.1	0.3
Regular credits	2.3	2.5	-0.2	0.2
Developmental credits	3.0	2.7	0.3	0.2
First postprogram semester				
Registered for any courses (%)	61.0	60.9	0.1	3.0
Number of credits attempted	6.0	5.9	0.1	0.3
Regular credits	3.5	3.3	0.2	0.3
Developmental credits	2.5	2.6	-0.1	0.2
Number of credits earned	3.6	3.5	0.0	0.3
Regular credits	2.2	2.1	0.1	0.2
Developmental credits	1.3	1.4	-0.1	0.1
Cumulative[a]				
Number of semesters registered for any courses	1.5	1.5	0.0	0.1
Number of credits attempted	14.1	14.2	-0.1	0.6
Regular credits	6.9	7.0	0.0	0.4
Developmental credits	7.2	7.2	0.0	0.4
Number of credits earned	9.0	9.1	0.0	0.5
Regular credits	4.7	4.7	0.0	0.3
Developmental credits	4.4	4.3	0.0	0.3
Sample size (total = 1,273)	761	512		

(continued)

Table 6.2 (continued)

SOURCE: MDRC calculations from Houston Community College transcript data.

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

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

The probability of being assigned to the treatment group varies within cohorts, and estimates are weighted to account for the different random assignment ratios. Standard errors are clustered by learning community link.

Estimates are adjusted by cohort, campus, and score on the pre-algebra placement test at baseline.

All measures are based on courses that sample members are still enrolled in at the end of the add/drop period.

[a]Cumulative measures include courses taken from the program semester through the first postprogram semester, and include summer terms.

glance. It is important to keep in mind that because these students are likely to be time-constrained, shifting students into taking a given course may mean that they are *not* taking something else. Analyses conducted, but not shown here, suggest that learning community students substituted developmental math for some developmental English and reading courses during the program semester; thus, the average number of developmental credits attempted and earned was the same for program and control group students.

After the program semester, there continued to be no statistically significant impacts of the program on credits attempted or earned in the postprogram semester or measured cumulatively for both semesters.

Summary of Results for the Full Sample

Houston's learning communities program significantly increased developmental math students' likelihood of taking and passing Math I (the lowest level of developmental math) during the program semester.

Although there was some catch-up of control group students, by the end of the first postprogram semester, program group students remained on average further ahead in the developmental math sequence; in other words, they were more likely to have successfully completed Math I. While program group students were more likely to attempt the next level of developmental math than control group students, they were no more likely to pass it. There are no cumulative impacts of the program on persistence, credits attempted, or credits earned measured one semester after the program ended.

Subgroup Analyses

The impacts are examined separately by early and late cohorts, by level of developmental need as determined by students' scores on a math placement test, and by gender. These

subgroups were chosen for the following reasons. First, later cohorts were exposed to a more comprehensive learning community model, as described in the implementation analysis. The impact analysis tests to see if the impacts of the arguably lower-quality intervention were discernibly different from that of the higher-quality intervention. Second, those with the lowest math ability are likely to be those who need the most help in fulfilling these math requirements. Analyzing the impacts of learning communities separately for those with high and low math scores can shed light on whether learning communities provide the additional help these students need. Finally, since there are often differences in performance in college by gender, it is interesting to see whether that was the case in this intervention.

Cohort

The implementation analysis in Chapter 5 shows that learning communities took time to develop at the three Houston campus sites, and that this time was not uniform across sites. The analysis in this section tests whether these findings from the implementation analysis translate into statistically measurable differences in program impacts from the early, and less comprehensive, learning communities, compared with the later, and more comprehensive, learning communities.

For the math class outcomes (Appendix Table A.7) and the persistence and credit measures (Appendix Table A.8), the differences in the program impacts between the early and late cohorts are too small to say with any statistical precision whether they are really different from one another.[2] There could be several explanations for this: Perhaps there is a "threshold" level of comprehensiveness required to make an additional difference in students' learning that was not reached by the Houston learning communities, even though they improved over time. Alternately, it could be that the components of learning communities where improvement was primarily observed (curricular integration and faculty collaboration) have a smaller effect on students compared with the effects of student engagement arising from co-enrollment. In this interpretation, the lack of difference over time could be because co-enrollment was well implemented each semester, and the changes and improvement to other components over time did not significantly alter students' academic outcomes.

Level of Developmental Need

Even among those who place into the lowest level of developmental math at Houston, there is substantial variation in math preparation and ability. This section investigates whether the learning community intervention had a differential impact by level of developmental need,

[2]If the estimated impacts are statistically significantly different for the subgroups, that is indicated by a dagger symbol in the far right column.

as measured by students' scores on a pre-algebra placement test. The students are split into two groups: Those with placement test scores below the median are labeled "Below Median," and those with scores at the median or above are labeled "Above Median."[3] Table 6.3 shows the results of breaking the data into these subgroups for course outcomes. Before analyzing the impacts, it is worth noting that placement test scores do seem to capture something important about students' probability of passing developmental math. As one might expect, for students in the control group — who can be considered to experience "business as usual" at the college — those with low math placement test scores passed Math I at lower rates than those with high math placement test scores in the program semester (31.0 versus 50.4 percent).

Turning to the estimated impacts of learning communities on course outcomes in Table 6.3, one sees that there are many cases where the estimated impacts for the low and high math skill groups are statistically significantly different from one another. The estimated program impact is larger for Below Median students in terms of the probability of passing Math I. Program group students increased their probability of *attempting* Math I above control group students in both ability groups, and by about the same amount. However, for the low-ability students there is a 21.4 percentage point estimated impact of the learning community on *passing*, and this is statistically different from the estimated 6.7 percentage point increase in passing for the higher-ability students. For the low-ability students, there is a statistically significant decrease in the probability of taking Math I and *not* passing it, and this is statistically different from the small positive estimated impact of taking and not passing Math I for the higher-ability students. These results strongly suggest that learning communities improved performance of low-ability students in Math I in the program semester. In fact, in the program semester, low-ability students in the learning community group passed Math I at rates about equal to those of high-ability students in the control group. For the Below Median students, there was also an improvement in taking and passing the College Career and Planning course, and this impact was statistically different from that for the Above Median group.

As with the overall sample, the most important math class outcomes in the postprogram semester are for Math II. Did the program's large beneficial effect on Math I in the program semester for the low-skilled group turn into sustained progress through the required developmental math sequence? The learning community did increase the probability that the lower-skilled math students attempted Math II (a 15.1 percentage point decrease in the probability of not attempting the course), and this impact is significantly different from that estimated for the higher-math ability group. However, this increase in attempts is associated only with a small increase in passing Math II for program group students over control group students, and that

[3]The 10 percent of observations with missing data were dropped from this analysis, leading to a lower total number of observations compared with the other analyses.

The Learning Communities Demonstration

Table 6.3

Houston Transcript Outcomes by Placement Test Score, Math Progression Learning Communities for Students in Developmental Math

Outcome (%)	Below Median				Above Median				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Program semester									
Fundamentals of Mathematics I									
Passed	52.5	31.0	21.4 ***	4.2	57.1	50.4	6.7	4.9	†††
Attempted but did not pass	27.4	39.2	-11.8 ***	4.2	18.4	15.2	3.2	3.1	†††
Did not attempt	20.1	29.8	-9.7 **	4.3	24.5	34.4	-9.9 **	4.7	
College and Career Planning course									
Passed	58.4	46.4	12.0 ***	4.3	60.6	59.7	0.9	4.9	†
Attempted but did not pass	22.1	25.7	-3.6	3.6	20.0	15.1	4.9	3.3	†
Did not attempt	19.5	27.8	-8.3 **	4.1	19.4	25.2	-5.8	4.3	
First postprogram semester									
Fundamentals of Mathematics II									
Passed	9.3	5.9	3.4 *	2.0	21.4	19.4	2.0	3.4	
Attempted but did not pass	27.2	15.6	11.7 ***	3.3	17.0	19.1	-2.1	3.6	†††
Did not attempt	63.4	78.5	-15.1 ***	3.7	61.6	61.5	0.1	4.4	†††
Cumulative[a]									
Any developmental math[b]									
Passed	57.6	39.9	17.7 ***	4.0	64.1	62.4	1.6	4.7	†††
Attempted but did not pass	27.7	38.8	-11.0 ***	3.9	19.9	21.5	-1.6	3.5	†
Did not attempt	14.7	21.3	-6.6 *	3.6	16.1	16.1	0.0	3.7	

(continued)

Table 6.3 (continued)

Outcome	Below Median				Above Median				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Fundamentals of Mathematics I									
Passed	56.8	40.0	16.9 ***	4.1	60.1	56.2	3.9	4.9	††
Attempted but did not pass	26.7	38.0	-11.3 ***	3.9	17.4	16.6	0.8	3.2	††
Did not attempt	16.5	22.0	-5.6	3.8	22.5	27.2	-4.7	4.4	
Fundamentals of Mathematics II									
Passed	10.8	6.2	4.6 **	2.0	25.2	26.4	-1.2	3.7	
Attempted but did not pass	28.0	16.3	11.7 ***	3.3	18.6	21.4	-2.7	3.6	†††
Did not attempt	61.1	77.4	-16.3 ***	3.7	56.1	52.2	3.9	4.6	†††
College and Career Planning course									
Passed	62.7	54.2	8.5 **	4.3	64.4	67.9	-3.5	4.6	††
Attempted but did not pass	21.9	24.2	-2.4	3.5	19.1	12.4	6.7 **	3.0	††
Did not attempt	15.4	21.6	-6.1 *	3.7	16.5	19.7	-3.2	3.9	
Sample size (total = 1,228)	392	258			343	235			

SOURCE: MDRC calculations from Houston Community College transcript data.

NOTES: Students who did not take the COMPASS pre-algebra placement test prior to random assignment are excluded from this table.

The "Below Median" subgroup refers to students who scored at or below the median pre-algebra COMPASS placement test score at the time of their random assignment. The "Above Median" subgroup refers to students who scored above the median.

Rounding may cause slight discrepancies in sums and differences.

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

A two-tailed t-test was applied to differences of impacts between subgroups. Statistical significance levels are indicated as: ††† = 1 percent; †† = 5 percent; † = 10 percent.

The probability of being assigned to the treatment group varies within random assignment cohorts, and estimates are weighted to account for the different random assignment ratios. Standard errors are clustered by learning community link.

Estimates are adjusted by cohort, campus, and score on the pre-algebra placement test at baseline.

All measures are based on courses that sample members are still enrolled in at the end of the add/drop period.

[a]Cumulative measures include courses taken from the program semester through the first postprogram semester, and include summer terms.

[b]Includes MATH 0101, MATH 0102, MATH 0106, MATH 0108, MATH 0112, MATH 0306, MATH 0308, MATH 0312. The percentage of students attempting any developmental math course may be less than the sum of students attempting either MATH 306 (Fundamentals of Mathematics I) or MATH 308 (Fundamentals of Mathematics II) because some students enrolled in both MATH 306 and MATH 308.

program impact is not different from the impact on passing for the high-skilled group. For the low-skilled students, there was an 11.8 percentage point increase in the fraction of students who took and did not pass Math II, and that impact is statistically different from the (negative) impact for higher-skilled students.

Measures of college persistence and credits attempted and earned are shown in Table 6.4. The estimated impact of learning communities on registering for courses, a measure of persistence, is estimated imprecisely, and although the impact in the program semester is positive and marginally statistically significant for the Below Median group, it is not statistically significant from the estimated impact for the Above Median group. Turning to credits, the learning community is estimated to have increased credits earned, both in the program semester and cumulatively for the Below Median group. By the end of the first postprogram semester, the Below Median students who had the benefit of a learning community accumulated about 1.5 more credits than control group students, and this impact is statistically different from the negative 1.6 credit impact estimated for the Above Median students.[4]

These results strongly suggest that learning communities in the Houston setting improved math class outcomes for those students with the greatest need of math remediation, at least in the semester when the program was operating. Furthermore, the learning community improved performance in Math I for low math ability students without substituting performance in math for performance in developmental English or reading classes.

Gender

As at Queensborough, there is some evidence that the developmental math learning communities at Houston have a more positive impact on women than men. Learning communities are more likely to have a statistically important effect for women on some academic outcomes. However, the differences in impacts for women and men are not generally statistically different from one another. Appendix Tables A.9 and A.10 present detailed findings on gender subgroups at Houston.

Summary of the Houston Results

Learning communities in Houston improved progress along the developmental math sequence. At the end of the postprogram semester, program group students were 10.2 percentage points more likely to have passed Math I than control group students. The impact on passing math was driven not only by a higher number of attempts, but by the fact that students

[4]The estimated negative impact on credits earned for the Above Median group is not due to an adverse impact on math class performance, since none is evidenced in Table 6.3.

The Learning Communities Demonstration

Table 6.4

Houston Transcript Outcomes by Placement Test Score, Credit and Persistence Measures

Learning Communities for Students in Developmental Math

Outcome	Below Median				Above Median				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Program semester									
Registered for any courses (%)	84.6	78.3	6.3 *	3.7	84.6	84.6	0.0	3.6	
Enrolled in a learning community (%)	72.4	0.6	71.8 ***	4.0	71.0	2.7	68.3 ***	4.2	
Number of credits attempted	7.8	7.5	0.4	0.4	7.8	8.1	-0.3	0.5	
Regular credits	3.1	2.9	0.2	0.2	3.6	3.9	-0.3	0.3	
Developmental credits	4.7	4.5	0.2	0.3	4.2	4.2	0.0	0.3	
Number of credits earned	5.2	4.2	1.0 ***	0.4	5.4	6.2	-0.8 *	0.4	†††
Regular credits	2.1	1.8	0.3	0.2	2.4	3.0	-0.6 *	0.3	††
Developmental credits	3.1	2.3	0.7 ***	0.2	2.9	3.2	-0.2	0.3	†††
First postprogram semester									
Registered for any courses (%)	61.4	56.1	5.2	3.8	60.5	66.8	-6.3	4.4	††
Number of credits attempted	5.8	5.1	0.6	0.4	6.2	6.7	-0.5	0.5	†
Regular credits	3.0	2.5	0.4	0.3	3.9	4.0	0.0	0.4	
Developmental credits	2.8	2.6	0.2	0.3	2.2	2.7	-0.5 *	0.2	††
Number of credits earned	3.1	2.6	0.5	0.3	4.0	4.6	-0.6	0.4	††
Regular credits	1.8	1.4	0.4	0.2	2.7	2.8	-0.1	0.3	
Developmental credits	1.3	1.2	0.1	0.2	1.3	1.8	-0.5 **	0.2	††

(continued)

Table 6.4 (continued)

Outcome	Below Median				Above Median				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Cumulative[a]									
Number of semesters registered for any courses	1.5	1.4	0.1	0.1	1.5	1.6	-0.1	0.1	††
Number of credits attempted	13.9	13.0	0.9	0.7	14.2	15.3	-1.1	0.9	††
Regular credits	6.2	5.6	0.5	0.5	7.6	8.0	-0.4	0.7	
Developmental credits	7.7	7.3	0.4	0.5	6.6	7.2	-0.6	0.5	†
Number of credits earned	8.5	7.0	1.5 **	0.6	9.5	11.1	-1.6 **	0.8	†††
Regular credits	4.0	3.4	0.7 *	0.4	5.2	5.9	-0.7	0.5	††
Developmental credits	4.5	3.6	0.8 **	0.3	4.3	5.2	-0.9 **	0.4	†††
Sample size (total = 1,228)	392	258			343	235			

SOURCE: MDRC calculations from Houston Community College transcript data.

NOTES: Students who did not take the COMPASS pre-algebra placement test prior to random assignment are excluded from this table.

The "Below Average" subgroup refers to students who scored at or below the median pre-algebra COMPASS placement test score at the time of their random assignment. The "Above Average" subgroup refers to students who scored above the median.

Rounding may cause slight discrepancies in sums and differences.

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

A two-tailed t-test was applied to differences of impacts between subgroups. Statistical significance levels are indicated as: ††† = 1 percent; †† = 5 percent; † = 10 percent.

The probability of being assigned to the treatment group varies within random assignment cohorts, and estimates are weighted to account for the different random assignment ratios. Standard errors are clustered by learning community link.

Estimates are adjusted by cohort, campus, and score on the pre-algebra placement test at baseline.

All measures are based on courses that sample members are still enrolled in at the end of the add/drop period.

[a]Cumulative measures include courses taken from the program semester through the first postprogram semester, and include summer terms.

in learning communities who attempted math were more successful at passing it than those in stand-alone courses. Possible explanations for this improved performance could be that the student success course at Houston gave students the study skills they needed to better succeed in math, or that that high levels of student engagement arising from co-enrollment were particularly beneficial for students in Houston's diffuse setting.

At the end of the first postprogram semester, students in learning communities were still more likely to have passed Math I and were more likely to have attempted Math II than students in the control group. In addition, there is evidence that learning communities at Houston had different effects for students with different levels of math preparation or ability. For students with Below Median math placement test scores, the learning community had a larger beneficial effect than for students with Above Median math scores: By the end of the first postprogram semester, the low-scoring students who were assigned to a learning community were more likely than control group students to have taken and passed a developmental math class, and they had accumulated more total credits, suggesting that for students with the greatest need of math remediation, this was not purely a substitution of one type of class for another.

It is tempting to compare the results from Houston and Queensborough; even though there are differences between the two colleges and their programs, the results are strikingly more similar than they are different. In neither site did program group students, overall, enroll in more semesters or accumulate more credits than control group students. In Houston, especially, since program group students were more likely than control group students to have passed a math class, this strongly suggests that progress in math was a substitute for progress in other developmental courses. At both Queensborough and Houston, the primary effect of the learning community was to get students to take and pass the developmental math course to which they were assigned in their first semester. It may be unsurprising that when students were no longer in a learning community after the program semester, there was little continued impact on performance in classes. This indicates that getting students who are initially referred to developmental math through their *entire* required math sequence is more complicated than simply getting them over the hurdle of the *first* course in that sequence. Whether there is a longer-term benefit to having cleared the hurdle of the first math course in one's first term would require a longer follow-up on outcomes of these students in subsequent semesters.

Chapter 7

Conclusions and Reflections

The two colleges described in this report differ in many ways, and each implemented a variation on the learning communities model. Most notably, Queensborough Community College's program served students at all levels of developmental math and linked these courses primarily with college-level academic courses. Houston Community College focused on students in the lowest course in its developmental math sequence and linked the math course with a student success course. As detailed in Chapter 2, the average student at these two institutions differs as well: At Queensborough, students are more likely to enroll full time, whereas at Houston they are more likely to be enrolled part time. Students in the study sample at Houston were also older and more likely to be married or have children. Perhaps as a reflection of these differences in populations, students at Queensborough were more likely to persist in enrollment in subsequent semesters than those at Houston, both among the general population and the study sample.[1] On the other hand, students at Houston — who were generally placed into a lower-level math course — experienced higher overall math pass rates (for both the program and control groups) than students at Queensborough, where equal math placement scores could place students into a course with more advanced material.

The colleges also exhibited different strengths and weaknesses as they implemented their respective programs, as noted in Chapters 3 and 5. At Houston, the most salient feature of the learning communities was the student relationships created by co-enrollment, followed by a low level of curricular integration that increased over time; at Queensborough, strengthened relationships between faculty and students and thematic links between courses stood out as the components that most differentiated the program from regular services.

Regardless of these and other differences, by many measures there was greater variation between the learning communities within each college than between the two programs, with much overlap in the learning communities each college offered and the students who participated: Both Queensborough and Houston co-enrolled cohorts of students into developmental math and another linked course, offered connections to student support services, and had growth — albeit variably — in curricular integration and faculty collaboration during the study period.

At the two colleges, many common trends were observed in the impacts of their developmental math learning communities. Taken together — and keeping in mind other studies

[1] U.S. Department of Education (2007).

of learning communities for academically underprepared students — these diverse, urban community colleges tell a story that may provide important lessons for other colleges.[2]

When Queensborough and Houston launched their learning communities, one of their short-term goals was to encourage and assist students to begin the developmental math sequence early in their college tenure. Both colleges succeeded in this goal. Kingsborough's Opening Doors learning communities similarly improved students' initial progress in the developmental English sequence; other colleges that want to encourage students to tackle certain classes early in college may consider learning communities as a way of doing that. (However, it should be noted that the developmental reading learning communities program at Hillsborough Community College did not have an impact on students' reading course attempt rates or other academic outcomes for the full sample.) If higher attempt rates are the only goal, colleges could simply require students to take these courses; interestingly, though, Houston's program had an impact not only on students enrolling in developmental math, but also on enrollment levels for an ostensibly mandatory student success course. The fact that students in the learning communities program group took the student success course at higher rates than those in the control group suggests that something about the learning communities model made these courses more enticing to students or that the classes were more effectively encouraged or mandated for students in the learning communities.

Clearly, the learning communities at Queensborough and Houston gave students a significant boost in their start along the developmental math sequence. But what has often proved more difficult in instituting educational reforms and enhancements is ensuring longer-term success; likewise, the longer-term results of the programs at these colleges are somewhat unclear and less encouraging. The results are not final, as only one to two semesters of post-program follow-up are available. But the current findings begin to answer some important questions about the relationship between developmental math learning communities, progress through the developmental math sequence, and longer-term student success.

Does Prompt Enrollment in Developmental Math Drive Further Success?

At both colleges, at least in part as a result of the higher rate of enrollment in developmental math, students in the learning communities group passed developmental math during the

[2]Because of their similar research designs and target populations, the findings from evaluations of Hillsborough Community College's developmental reading learning communities and Kingsborough Community College's Opening Doors English learning communities are referenced throughout this concluding chapter. For detailed findings, see Weiss, Visher, and Wathington (2010) and Scrivener et al. (2008).

program semester at significantly higher rates than their control group counterparts, an important first step toward further success.

At Houston, the impact on passing developmental math was driven not only by higher attempt rates, but also by the fact that students who attempted math in learning communities passed the course at higher rates than those who attempted the same coursework in stand-alone classes. Possible explanations for this improved performance could be that the student success course at Houston gave students the study skills they needed to better succeed in math or that the high levels of student engagement arising from co-enrollment were particularly beneficial for students in Houston's diffuse setting. Another explanation could be that the teachers in these learning communities were more likely to give their students passing grades, either as a result of more effective teaching methods or simply of more generous grading curves. Regardless, in the program semester at both colleges, students were more likely to pass their developmental math classes, and thus students in learning communities were more likely than their control counterparts to enter the next semester a "step ahead" in the math sequence.

Does Initial Success in Development Math Lead to Continued Progress in the Sequence?

For both colleges, the math progression measures presented in Chapters 4 and 6 show students' continued movement along the developmental math sequence. These analyses also serve as a potent reminder that for many students — both in and out of learning communities — progress along the developmental math sequence is a long and often never-finished journey. A key question, then, is whether learning communities' initial boost helps students continue to progress and complete the sequence.

Results at the two colleges were generally similar. As shown in Chapter 4, at Queensborough the students in the learning communities group progressed along the sequence so that in the first postprogram semester they were more likely to pass their second math class. However, by the second postprogram semester, control group members had "caught up" with those who participated in learning communities and were at the same levels on nearly all measures of cumulative progress. At Houston, by the end of the first postprogram semester, program students retained some advantage over their control group counterparts; more students were likely to be eligible for the next level of developmental math. However, there was no measurable difference between the percentage of program and control group students who *passed* this next higher-level course, indicating that the early impacts on progress along the sequence did not lead to continued impacts on progress through the developmental sequence and into college-level math. Thus at both colleges — as in Kingsborough's Opening Doors English learning communities — there is strong evidence that early progress in the developmental course in a learning community is not sufficient to generate sustained progress along the sequence after two

or three semesters. These findings do not rule out the possibility that learning communities, had they continued for students in subsequent semesters, could have improved outcomes for higher-level courses in the sequence.

Interestingly, there is evidence that some of the interim progress along the math sequence that resulted from learning communities represents a substitution for other courses. For Houston, analyses confirmed that program group students were less likely than control group students to take and pass courses in the developmental English sequence. In other words, in some cases learning communities helped students accelerate their progress through developmental math, while decelerating their progress through developmental reading and writing. Whether the shift toward math requirements early in students' college careers will provide a long-term educational advantage is unknown at this point; this may be ascertained with a longer follow-up period.

Does Early Progress in the Math Sequence Lead to Improvements in Other Outcomes?

Many theorize and logically presume that attempting and passing developmental math early in students' college experience will increase their likelihood of earning a degree or credential or of transferring to a four-year institution. In addition to progress through the developmental math sequence, this study measured two key indicators of progress toward long-term success: persistence and credit accumulation. At the end of the study period covered in this report, neither college had achieved significant measurable impacts on these measures. Thus, the results of this study show that this change in course-taking patterns may not be enough to lead to students' longer-term progress and success.

However, it is important to note that while initial indications do not show long-term impacts, a longer follow-up period would be required to answer the question of whether impacts on measures such as college credits earned or receipt of a certificate or degree may emerge in later semesters. In 2012, the National Center for Postsecondary Research (NCPR) will release a final synthesis report with longer follow-up at two or more colleges in the Learning Communities Demonstration. (Similar longer-term follow-up is being conducted for Kingsborough's Opening Doors study.)

What About Student Engagement and Deeper Learning?

Faster progress through the developmental math sequence is only one possible route to success for students in learning communities. As discussed in Chapter 1, theoretical work and earlier studies of learning communities also suggest that learning communities can boost

persistence and success by providing students with sense of engagement with the institution, as well as by facilitating deeper learning. Students and faculty at Queensborough, and particularly at Houston, reported that students in the learning communities felt supported both personally and academically, yet this did not translate into a measurable increase in their likelihood of persisting in college. Similarly, the lack of longer-term impacts on passing classes further along the math sequence or on cumulative credits earned suggests that there was not a substantial sustained effect on learning, though without post-test scores of all sample members it is impossible to know for certain whether deeper learning was engendered by Queensborough's and Houston's learning communities.

It is important to remember, however, that the learning communities programs in this study were — on the whole — at the more basic end of the spectrum. It is possible that more extensive and consistent faculty collaboration, curricular integration, or other aspects of comprehensive learning communities might lead to larger or more sustained effects. For example, in the study of Hillsborough's developmental reading learning communities, the program was implemented as a relatively basic model, and cohort analysis conducted in that study provides evidence that the maturation of the program may have led to increased persistence in the semester after the program; however, this initial impact on persistence was not evident by the second semester after the program. In contrast, the cohort analysis conducted for Queensborough and Houston showed that the more robust versions of the learning communities, as implemented in later semesters, were not necessarily associated with significantly larger impacts. Queensborough's learning communities in later semesters did appear more effective than in the first, but as is the case for the full sample, they led to impacts in the program semester that were mostly no longer evident by the second postprogram semester.

These findings suggest that while program maturation in basic learning communities may lead to qualitative improvements in the program model and implementation and to increases in the number of outcomes impacted and the magnitude of impacts in the program semester, these important short-term improvements are not enough to ensure that learning communities' impacts will persist and lead to longer-term success.

Does a Certain Type of Student Benefit Most from Developmental Learning Communities?

The subgroup analyses conducted for students at Queensborough and Houston suggest that the effects of learning communities differed somewhat between some groups of students, but there is no subgroup or type of student that clearly or consistently benefits the most from learning communities. At both colleges, women seemed to experience greater benefits than men, though these gender differences are generally not statistically significant. Interestingly, Kingsborough's Opening Doors learning communities showed the opposite effect: Men appeared to benefit

somewhat more than women from developmental reading learning communities. At Hillsborough, there was no measurable difference in impacts between women and men.

At Houston, the most encouraging program impacts were seen for students who placed at the lowest levels on the math placement test; in addition to the increased progress along the math sequence that was seen for the full sample, there were also indications that students at the lowest levels of math were earning more credits overall than their control group counterparts in the program semester, though not in the postprogram semester. At Queensborough, a similar analysis did not show any difference in program impacts for students above or below the median math placement score in their class.

Generally speaking, even where subgroup differences are found, there is a pattern of impacts similar to those seen for the full group of students: Semester-long learning communities for students in developmental classes have the potential to significantly impact students' success in the program semester, but these impacts — the differences between those in learning communities and those in regular stand-alone classes — have been seen to diminish sharply over the next few semesters. Future subgroup analyses from other sites, as well as statistical pooling of the data across these sites or others, might help better identify groups of students for whom learning communities are most effective.

What's Next for Learning Communities?

The findings presented in this report — as well as the results of other studies of learning communities discussed in Chapter 1 — clearly suggest that learning communities can help some students initially progress more quickly through the developmental sequence. Yet while any progress in this challenging and important area is promising, the impacts observed at these two colleges and others show that a program of semester-long learning communities alone cannot be expected to help large numbers of students progress through the developmental math or English sequence and into the college-level courses that are typically required for a degree or transfer.

Regardless of the limited benefits seen beyond the program semester, because the costs of learning communities at Houston (and likely many other colleges as well) were relatively moderate, it appears in the short run that the costs of learning communities come largely as effort and opportunity cost. If faculty, staff, and students enjoy learning communities, these programs may well be a sensible tool for giving students an immediate boost in their developmental coursework progress, even if learning communities alone do not guarantee students' future success. Furthermore, learning communities may serve as a point of focus for faculty development and building faculty practice, and faculty or administrators may feel a personal or

institutional benefit from learning communities independent of their direct impacts on students in the classes.[3] However, if there is not buy-in among faculty and administrators, the evidence to date suggests that it may not be prudent to require the launch or scale-up of learning community programs; faculty may be better off focusing on other ways of improving their teaching or exploring new modes of instruction that may enhance their students' success.

Can the Effects of Learning Communities Be Improved or Sustained?

The diminishing effects seen from semester-long learning communities suggest that longer-term improvements in student success may require more intensive interventions, interventions that continue into subsequent semesters, or wholly new approaches. In fact, administrators at both Queensborough and Houston are currently considering ways to build on the in-program effects of learning communities, for example by creating a yearlong freshman experience program that encompasses a learning community. Other approaches could entail yearlong learning communities or following the learning communities semester with follow-up services targeted toward students in their next classes.

Future research should consider whether these more expansive programs could have more sustained effects for student success. Attention will need to be paid to the complexity of implementing these programs, and it may be found that few — if any — large-scale, comprehensive, learning communities programs are implemented consistently well. Anecdotal evidence suggests that the majority of learning communities programs nationally — like those in the Learning Communities Demonstration — do not consistently implement all of the components of an advanced model and generally experience variation or fluctuation within the programs and over time.

Looking Ahead in the Learning Communities Demonstration

The results presented in this report help paint a much clearer picture of the impact that learning communities can have on students in need of developmental coursework. However, with findings from only the first three of the six community colleges in the Learning Communities Demonstration released to date, there is still a much fuller understanding to be gained. Several unanswered questions remain: Will the impacts estimated at the other colleges follow the same patterns as those already analyzed? Do more comprehensive learning communities have a greater impact? Do learning communities tend to work better for certain subgroups, such as students at a lower level of academic preparation? Will additional impacts emerge with

[3] Grubb (1999).

longer follow-up? How do the costs of the learning communities compare with the longer-term benefits of the program?

The next report in this series will examine the impacts of the Career-Focused Learning Communities at Kingsborough Community College, which targeted continuing students, linking two college-level courses in specific majors with a single-credit "integrative seminar" designed to help students see connections between their coursework and career goals. The subsequent report will present the impacts of the developmental English learning communities at Merced College and The Community College of Baltimore County. These three colleges generally implemented learning communities with more advanced teacher collaboration, integration, or student support services than the first three colleges in the demonstration, though the variation in instructional strategies and strength of program implementation seemed at least as great *within* each college as *across* the six colleges.

A final report, scheduled to be released in 2012, will synthesizes findings across all six colleges in order to provide rigorous evidence on the effectiveness of learning communities for developmental-level students. In this final report, NCPR will reflect on these findings, particularly in light of any other new research on learning communities. NCPR will also conduct additional analyses. It will pool some results across colleges, conduct further follow-up on students from two or more colleges to look for impacts that might continue or emerge after the two to three semesters of data analyzed in the initial reports, and further analyze the program costs and effects at Houston — as well as for learning communities at CCBC — to help determine whether any longer-term effects of the program outweigh the costs.

Appendix A

Supplementary Tables

The Learning Communities Demonstration

Appendix Table A.1

Queensborough: Results of Learning Community Syllabi Analysis
Learning Communities for Students in Developmental Math

Practice	Number of References to Practices			
	First Semester (Fall 2007)	Second Semester (Spring 2008)	Third Semester (Fall 2008)	Fourth Semester (Spring 2009)
Integration and linking				
Mentioning other link/instructor in title	2	5	3	4
Referring to both/all classes as a learning community	2	9	5	8
Clear description of what a learning community is	0	2	2	1
Joint practice (i.e., if students drop class, must drop both)	0	0	0	0
Theme is mentioned	0	5	5	7
Theme is referenced throughout the syllabus	0	1	0	0
Instructors team teach	0	0	0	0
Instructors sit in each other's classes	0	0	0	0
Synchronized assignments	0	3	5	3
Integrated/shared assignments	0	1	0	2
Synchronized topics/readings	2	4	5	1
Theme reflected in assignments and readings	0	7	5	5
Shared grading	0	0	0	0
Common readings or textbooks for both classes	0	0	0	0
Other	0	0	0	0
Subtotal	6	37	30	31
Average score	3.0	7.4	3.8	4.4
Active and collaborative teaching and learning				
Group or team work	2	1	3	2
Student or team presentations	0	3	4	3
Peer evaluations	2	3	3	3
Reflections on own work (journals, portfolios)	2	2	2	2
Class discussions	2	5	8	10
Credit for participation	2	5	8	8
Theme-connected project-based learning	0	0	0	0
Service learning project reinforcing LC theme	0	0	0	0
Field trip related to LC theme	0	0	0	0
Other	0	0	0	0
Subtotal	10	19	28	28
Average score	5.0	3.8	3.5	4.0
Total	**16**	**56**	**58**	**59**
Average score	**8.0**	**11.2**	**7.3**	**8.4**
Total sets possible	6	5	8	7
Total sets received	2	5	8	7

SOURCE: Syllabus sets collected from Queensborough Community College.

The Learning Communities Demonstration

Appendix Table A.2

Queensborough Transcript Outcomes by Placement Test Score, Math Progression

Learning Communities for Students in Developmental Math

Outcome (%)	Below Median				Above Median				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Program semester progression									
First math in sequence[a]									
Passed	26.4	16.8	9.6 **	4.5	42.5	29.6	12.9 **	5.3	
Attempted but did not pass	56.3	52.9	3.4	4.6	44.4	37.3	7.1	4.7	
Did not attempt	17.3	30.3	-13.0 ***	4.4	13.1	33.1	-20.0 ***	4.6	
First postprogram semester progression									
Second math in sequence[b]									
Passed	6.6	3.2	3.4 **	1.7	16.6	9.7	6.9 *	3.7	
Attempted but did not pass	12.5	8.6	3.9	2.9	15.5	13.0	2.5	3.1	
Did not attempt	80.9	88.2	-7.3 **	3.7	67.9	77.4	-9.5 **	4.6	
Cumulative progression[c]									
First math in sequence[a]									
Passed	34.9	28.2	6.7	5.1	49.0	44.2	4.8	5.6	
Attempted but did not pass	51.9	52.3	-0.5	4.7	40.0	38.5	1.5	5.0	
Did not attempt	13.2	19.5	-6.2	3.8	11.0	17.2	-6.3	3.9	
Second math in sequence[b]									
Passed	10.8	9.7	1.1	2.6	24.6	23.0	1.7	4.3	
Attempted but did not pass	19.2	15.5	3.7	3.7	20.2	17.6	2.7	3.7	
Did not attempt	70.0	74.8	-4.8	4.3	55.1	59.5	-4.3	4.9	

(continued)

Appendix Table A.2 (continued)

Outcome (%)	Below Median				Above Median				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Cumulative completion[c]									
Elementary Algebra[d]									
Passed	19.5	19.2	0.3	3.7	38.2	34.5	3.7	4.6	
Attempted but did not pass	44.6	35.3	9.3 *	5.0	38.6	38.4	0.2	4.9	
Did not attempt	35.9	45.5	-9.5 **	4.3	23.3	27.2	-3.9	4.8	
College-level math									
Passed	7.3	6.1	1.2	2.1	13.2	16.1	-2.8	3.5	
Attempted but did not pass	4.1	3.7	0.4	1.6	9.9	5.6	4.3 *	2.3	
Did not attempt	88.7	90.2	-1.5	2.7	76.8	78.3	-1.5	4.0	
Sample size (total = 989)	300	242			275	172			

SOURCE: MDRC calculations from Queensborough Community College transcript data.

NOTES: Students who did not take the COMPASS pre-algebra placement test prior to random assignment are excluded from this table.

The "Below Median" subgroup refers to students who scored at or below the median pre-algebra COMPASS placement test score within their level of math placement at the time of their random assignment. The "Above Median" subgroup refers to students who scored above the median.

Rounding may cause slight discrepancies in sums and differences.

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

A two-tailed t-test was applied to differences of impacts between subgroups. Statistical significance levels are indicated as: ††† = 1 percent; †† = 5 percent; † = 10 percent.

The probability of being assigned to the treatment group varies within random assignment cohorts, and estimates are weighted to account for the different random assignment ratios. Standard errors are clustered by learning community link.

Estimates are adjusted by cohort and score on the pre-algebra placement test at baseline.

All measures are based on courses that sample members are still enrolled in at the end of the add/drop period.

[a]Includes MATH 005 for those placed into MATH 005 at baseline. Includes MATH 010 and MATH 013 for those placed into MATH 010/013.

[b]Includes MATH 010/013 for those placed into MATH 005 at baseline. Includes MATH 114, 120, 301, and 321 for those placed into MATH 010/013.

[c]Cumulative measures include courses taken from the program semester through the second postprogram semester, and include summer terms.

[d]Includes MATH 010 and 013.

The Learning Communities Demonstration

Appendix Table A.3

Queensborough Transcript Outcomes by Placement Test Score, Credit and Persistence Measures

Learning Communities for Students in Developmental Math

Outcome	Below Median				Above Median				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Program semester									
Registered for any courses (%)	90.1	87.6	2.5	3.1	95.9	91.2	4.7 *	2.7	
Enrolled in a learning community (%)	82.9	-0.1	83.0 ***	3.5	88.2	0.2	88.0 ***	3.0	
Number of credits attempted	12.1	11.6	0.5	0.5	12.7	11.9	0.8 *	0.4	
Regular credits	6.0	5.9	0.1	0.4	6.9	6.6	0.3	0.4	
Developmental credits	6.0	5.7	0.4	0.4	5.8	5.3	0.5	0.4	
Number of credits earned	6.2	5.5	0.7	0.5	7.7	7.2	0.5	0.5	
Regular credits	3.9	3.4	0.5	0.4	4.8	4.4	0.3	0.4	
Developmental credits	2.3	2.1	0.2	0.3	2.9	2.7	0.2	0.3	
First postprogram semester									
Registered for any courses (%)	69.0	63.2	5.8	4.0	76.9	77.3	-0.4	3.9	
Number of credits attempted	8.5	7.7	0.7	0.5	9.9	9.7	0.2	0.6	
Regular credits	5.8	5.4	0.4	0.4	7.0	6.8	0.2	0.5	
Developmental credits	2.7	2.3	0.4	0.3	2.8	2.8	0.0	0.3	
Number of credits earned	4.8	4.2	0.5	0.5	5.9	5.9	0.1	0.6	
Regular credits	3.7	3.4	0.3	0.4	4.7	4.5	0.1	0.5	
Developmental credits	1.1	0.9	0.2	0.2	1.3	1.3	-0.1	0.2	

(continued)

Appendix Table A.3 (continued)

Outcome	Below Median				Above Median				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Second postprogram semester									
Registered for any courses (%)	54.2	54.7	-0.5	4.6	64.4	59.3	5.1	4.8	
Number of credits attempted	6.8	7.0	-0.2	0.6	7.6	7.4	0.2	0.7	
Regular credits	5.3	5.1	0.1	0.5	6.2	5.9	0.2	0.6	
Developmental credits	1.5	1.9	-0.4	0.2	1.5	1.5	0.0	0.2	
Number of credits earned	4.1	4.1	0.0	0.5	4.8	4.9	-0.1	0.6	
Regular credits	3.5	3.5	0.0	0.5	4.2	4.4	-0.2	0.5	
Developmental credits	0.5	0.6	-0.1	0.1	0.6	0.5	0.1	0.1	
Cumulative[a]									
Number of semesters registered for any courses	2.3	2.2	0.0	0.1	2.6	2.5	0.0	0.1	
Number of credits attempted	28.0	27.3	0.7	1.4	31.0	30.4	0.6	1.3	
Regular credits	17.3	16.8	0.5	1.1	20.4	20.0	0.4	1.2	
Developmental credits	10.7	10.4	0.3	0.8	10.6	10.4	0.2	0.6	
Number of credits earned	15.4	14.3	1.1	1.4	19.0	18.9	0.1	1.5	
Regular credits	11.3	10.5	0.8	1.1	13.9	13.8	0.1	1.2	
Developmental credits	4.1	3.8	0.3	0.5	5.1	5.1	0.0	0.5	
Sample size (total = 989)	300	242			275	172			

(continued)

Appendix Table A.3 (continued)

SOURCE: MDRC calculations from Queensborough Community College transcript data.

NOTES: Students who did not take the COMPASS pre-algebra placement test prior to random assignment are excluded from this table.

The "Below Median" subgroup refers to students who scored at or below the median pre-algebra COMPASS placement test score within their level of math placement at the time of their random assignment. The "Above Median" subgroup refers to students who scored above the median.

Rounding may cause slight discrepancies in sums and differences.

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

A two-tailed t-test was applied to differences of impacts between subgroups. Statistical significance levels are indicated as: ††† = 1 percent; †† = 5 percent; † = 10 percent.

The probability of being assigned to the treatment group varies within random assignment cohorts, and estimates are weighted to account for the different random assignment ratios. Standard errors are clustered by learning community link.

Estimates are adjusted by cohort and score on the pre-algebra placement test at baseline.

All measures are based on courses that sample members are still enrolled in at the end of the add/drop period.

[a]Cumulative measures include courses taken from the program semester through the second postprogram semester, and include summer terms.

The Learning Communities Demonstration

Appendix Table A.4

Queensborough Transcript Outcomes by Gender, Math Progression

Learning Communities for Students in Developmental Math

Outcome (%)	Males				Females				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Program semester progression									
First math in sequence[a]									
Passed	32.1	23.7	8.4 *	4.9	35.5	21.0	14.5 ***	4.7	
Attempted but did not pass	55.2	45.3	9.9 *	5.3	46.9	47.3	-0.4	4.5	
Did not attempt	12.6	31.0	-18.3 ***	4.6	17.6	31.7	-14.1 ***	4.5	
First postprogram semester progression									
Second math in sequence[b]									
Passed	9.0	5.1	3.9	2.4	13.0	6.7	6.3 **	2.6	
Attempted but did not pass	13.9	13.0	0.9	3.1	13.9	8.5	5.5 *	3.2	
Did not attempt	77.1	81.8	-4.7	3.8	73.1	84.8	-11.7 ***	4.2	
Cumulative progression[c]									
First math in sequence[a]									
Passed	40.1	33.9	6.3	5.4	42.8	35.5	7.3	5.3	
Attempted but did not pass	49.7	47.2	2.5	5.4	43.4	46.4	-3.0	4.6	
Did not attempt	10.2	18.9	-8.8 **	3.9	13.8	18.1	-4.3	3.9	
Second math in sequence[b]									
Passed	13.2	17.1	-4.0	3.5	20.5	14.3	6.2 *	3.3	††
Attempted but did not pass	21.3	18.2	3.1	3.8	18.7	14.5	4.2	3.7	
Did not attempt	65.6	64.6	0.9	4.7	60.8	71.2	-10.4 **	4.5	††

(continued)

Appendix Table A.4 (continued)

Outcome	Males				Females				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Cumulative completion[c]									
Elementary Algebra[d]									
Passed	25.2	27.0	-1.8	4.1	30.3	25.3	5.0	4.0	
Attempted but did not pass	44.5	36.6	7.9	5.1	39.2	37.0	2.2	5.1	
Did not attempt	30.4	36.4	-6.1	5.2	30.4	37.6	-7.2	4.6	
College-level math									
Passed	7.9	13.0	-5.1 *	3.1	11.7	8.5	3.2	2.4	††
Attempted but did not pass	9.4	6.1	3.3	2.2	4.7	3.6	1.0	1.7	
Did not attempt	82.7	80.9	1.8	3.5	83.7	87.9	-4.2	2.9	
Sample size (total = 989)	253	175			322	239			

SOURCE: MDRC calculations from Queensborough Community College transcript data.

NOTES: Students who did not take the COMPASS pre-algebra placement test prior to random assignment are excluded from this table.

Rounding may cause slight discrepancies in sums and differences.

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

A two-tailed t-test was applied to differences of impacts between subgroups. Statistical significance levels are indicated as: ††† = 1 percent; †† = 5 percent; † = 10 percent.

The probability of being assigned to the treatment group varies within random assignment cohorts, and estimates are weighted to account for the different random assignment ratios. Standard errors are clustered by learning community link.

Estimates are adjusted by cohort and score on the pre-algebra placement test at baseline.

All measures are based on courses that sample members are still enrolled in at the end of the add/drop period.

[a]Includes MATH 005 for those placed into MATH 005 at baseline. Includes MATH 010 and MATH 013 for those placed into MATH 010/013.

[b]Includes MATH 010/013 for those placed into MATH 005 at baseline. Includes MATH 114, 120, 301, and 321 for those placed into MATH 010/013.

[c]Cumulative measures include courses taken from the program semester through the second postprogram semester, and include summer terms.

[d]Includes MATH 010 and 013.

The Learning Communities Demonstration

Appendix Table A.5

Queensborough Transcript Outcomes by Gender, Credit and Persistence Measures

Learning Communities for Students in Developmental Math

Outcome	Males				Females				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Program semester									
Registered for any courses (%)	92.4	88.3	4.0	3.1	92.3	88.3	4.0	2.9	
Enrolled in a learning community (%)	86.7	0.0	86.7 ***	3.1	84.1	-0.1	84.1 ***	3.4	
Number of credits attempted	12.5	11.7	0.7	0.5	12.2	11.6	0.7	0.4	
Regular credits	6.4	6.0	0.4	0.4	6.4	6.3	0.1	0.4	
Developmental credits	6.1	5.8	0.3	0.5	5.8	5.3	0.5	0.4	
Number of credits earned	6.3	6.0	0.3	0.5	7.2	6.2	1.0 **	0.5	
Regular credits	3.9	3.6	0.4	0.4	4.5	3.9	0.6	0.4	
Developmental credits	2.4	2.4	-0.1	0.3	2.7	2.3	0.4	0.3	
First postprogram semester									
Registered for any courses (%)	71.3	70.5	0.9	4.1	72.6	67.8	4.7	3.8	
Number of credits attempted	8.9	9.1	-0.1	0.6	9.1	8.1	1.0 *	0.5	
Regular credits	6.2	6.3	-0.1	0.5	6.3	5.7	0.6	0.4	
Developmental credits	2.7	2.7	-0.1	0.3	2.8	2.4	0.4	0.3	
Number of credits earned	4.8	4.9	-0.1	0.5	5.6	4.9	0.8	0.5	
Regular credits	3.8	3.9	-0.1	0.4	4.4	3.7	0.7 *	0.4	
Developmental credits	1.0	1.0	0.1	0.2	1.2	1.1	0.1	0.2	

(continued)

Appendix Table A.5 (continued)

Outcome	Males				Females				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Second postprogram semester									
Registered for any courses (%)	57.3	55.9	1.4	4.6	60.1	55.6	4.5	4.4	
Number of credits attempted	6.9	7.1	-0.2	0.7	7.3	7.0	0.3	0.6	
Regular credits	5.4	5.5	-0.1	0.6	5.9	5.3	0.6	0.5	
Developmental credits	1.5	1.6	-0.1	0.2	1.5	1.7	-0.2	0.2	
Number of credits earned	4.0	4.2	-0.2	0.5	4.7	4.4	0.3	0.5	
Regular credits	3.5	3.7	-0.2	0.5	4.0	3.8	0.2	0.5	
Developmental credits	0.5	0.5	0.0	0.1	0.6	0.6	0.1	0.1	
Cumulative[a]									
Number of semesters registered for any courses	2.4	2.4	0.0	0.1	2.4	2.3	0.1	0.1	
Number of credits attempted	29.2	29.1	0.1	1.4	29.3	27.7	1.6	1.3	
Regular credits	18.3	18.3	-0.1	1.3	18.8	17.8	1.1	1.1	
Developmental credits	10.9	10.8	0.2	0.8	10.4	10.0	0.5	0.7	
Number of credits earned	15.6	16.0	-0.4	1.4	18.0	16.0	2.0	1.4	
Regular credits	11.4	11.7	-0.3	1.2	13.2	11.8	1.4	1.1	
Developmental credits	4.2	4.3	-0.1	0.5	4.8	4.3	0.5	0.5	
Sample size (total = 1,034)	273	182			335	244			

SOURCE: MDRC calculations from Queensborough Community College transcript data.

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

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

A two-tailed t-test was applied to differences of impacts between subgroups. Statistical significance levels are indicated as: ††† = 1 percent; †† = 5 percent; † = 10 percent.

The probability of being assigned to the treatment group varies within random assignment cohorts, and estimates are weighted to account for the different random assignment ratios. Standard errors are clustered by learning community link.

Estimates are adjusted by cohort and score on the pre-algebra placement test at baseline.

All measures are based on courses that sample members are still enrolled in at the end of the add/drop period.

[a]Cumulative measures include courses taken from the program semester through the second postprogram semester, and include summer terms.

The Learning Communities Demonstration

Appendix Table A.6

Houston: Results of Learning Community Syllabi Analysis
Learning Communities for Students in Developmental Math

Practice	Number of References to Practices			
	First Semester (Spring 2008)	Second Semester (Fall 2008)	Third Semester (Spring 2009)	Fourth Semester (Fall 2009)
Integration and linking				
Mentioning other link/instructor in title	1	1	4	9
Referring to both/all classes as a learning community	4	5	7	10
Clear description of what a learning community is	4	5	5	2
Joint practice (i.e., if students drop class, must drop both)	0	0	3	3
Theme is mentioned	0	0	0	0
Theme is referenced throughout the syllabus	0	0	0	0
Instructors team teach	0	0	0	0
Instructors sit in each other's classes	0	0	0	0
Synchronized assignments	0	1	1	1
Integrated/shared assignments	0	0	0	3
Synchronized topics/readings	0	0	0	0
Theme reflected in assignments and readings	0	0	0	0
Shared grading	0	0	0	3
Common readings or textbooks for both classes	0	1	4	1
Other	1	1	4	1
Subtotal	10	14	28	33
Average score	5.0	4.7	7.0	8.3
Active and collaborative teaching and learning				
Group or team work	0	4	6	5
Student or team presentations	0	3	3	5
Peer evaluations	0	0	0	0
Reflections on own work (journals, portfolios)	0	1	1	0
Class discussions	2	5	5	6
Credit for participation	1	1	2	3
Theme-connected project-based learning	0	0	0	0
Service learning project reinforcing LC theme	0	0	0	0
Field trip related to LC theme	0	0	0	0
Other	0	0	0	0
Subtotal	3	14	17	19
Average score	1.5	4.7	4.3	4.8
Total	**13**	**28**	**45**	**52**
Average score	**6.5**	**9.3**	**11.3**	**13.0**
Total sets possible	3	8	8	10
Total sets received	2	3	4	4

SOURCE: Syllabus sets collected from Houston Community College.

The Learning Communities Demonstration

Appendix Table A.7

Houston Transcript Outcomes by Cohort, Math Progression

Learning Communities for Students in Developmental Math

Outcome (%)	Early Cohorts				Late Cohorts				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Program semester									
Fundamentals of Mathematics I									
Passed	55.9	41.8	14.1 ***	5.1	52.4	38.8	13.6 ***	5.2	
Attempted but did not pass	22.8	31.0	-8.2 **	4.1	23.4	25.2	-1.9	3.7	
Did not attempt	21.3	27.2	-5.9	5.2	24.2	35.9	-11.7 **	5.2	
College and Career Planning course									
Passed	57.4	55.2	2.2	5.2	60.7	50.8	9.9 **	4.8	
Attempted but did not pass	22.6	21.1	1.5	4.0	19.5	20.1	-0.6	3.4	
Did not attempt	20.0	23.7	-3.7	5.0	19.8	29.1	-9.2 **	4.6	
First postprogram semester									
Fundamentals of Mathematics II									
Passed	15.9	13.6	2.4	3.3	14.2	11.0	3.1	2.5	
Attempted but did not pass	22.3	18.5	3.9	4.0	22.1	15.8	6.3 *	3.4	
Did not attempt	61.8	68.0	-6.2	4.6	63.7	73.1	-9.4 **	4.1	
Cumulative[a]									
Any developmental math[b]									
Passed	60.1	49.2	10.9 **	5.0	60.2	51.3	8.9 *	4.6	
Attempted but did not pass	23.3	33.3	-9.9 **	4.2	25.0	27.8	-2.9	3.6	
Did not attempt	16.6	17.5	-0.9	4.3	14.9	20.9	-6.0	3.9	

(continued)

Appendix Table A.7 (continued)

Outcome	Early Cohorts				Late Cohorts				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Fundamentals of Mathematics I									
Passed	58.5	47.9	10.6 **	5.1	56.9	46.9	10.0 **	4.9	
Attempted but did not pass	22.8	32.4	-9.5 **	4.1	21.9	24.2	-2.3	3.5	
Did not attempt	18.7	19.7	-1.0	4.7	21.2	28.9	-7.7 *	4.7	
Fundamentals of Mathematics II									
Passed	18.9	16.7	2.2	3.2	16.9	14.6	2.3	2.7	
Attempted but did not pass	22.3	19.4	3.0	4.0	24.4	17.7	6.8 **	3.4	
Did not attempt	58.8	63.9	-5.2	4.5	58.6	67.7	-9.1 **	4.1	
College and Career Planning course									
Passed	60.7	62.8	-2.1	5.1	65.4	58.6	6.8	4.4	
Attempted but did not pass	22.9	20.3	2.6	3.9	18.3	17.3	1.0	3.0	
Did not attempt	16.5	17.0	-0.5	4.3	16.3	24.1	-7.8 *	4.1	
Sample size (total = 1,273)	339	229			422	283			

SOURCE: MDRC calculations from Houston Community College transcript data.

NOTES: "Early Cohorts" refers to the earlier cohorts at each campus to experience the learning communities program (Northline campus cohorts 2 and 3, Southeast campus cohorts 3 and 4, and Central campus cohort 4). "Late Cohorts" refers to the later cohorts at each campus to experience the learning communities program (Northline campus cohorts 4 and 5, Southeast campus cohort 5, and Central campus cohort 5).

Rounding may cause slight discrepancies in sums and differences.

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

A two-tailed t-test was applied to differences of impacts between subgroups. Statistical significance levels are indicated as: ††† = 1 percent; †† = 5 percent; † = 10 percent.

The probability of being assigned to the treatment group varies within random assignment cohorts, and estimates are weighted to account for the different random assignment ratios. Standard errors are clustered by learning community link.

Estimates are adjusted by cohort, campus, and score on the pre-algebra placement test at baseline.

All measures are based on courses that sample members are still enrolled in at the end of the add/drop period.

[a]Cumulative measures include courses taken from the program semester through the first postprogram semester, and include summer terms.

[b]Includes MATH 0101, MATH 0102, MATH 0106, MATH 0108, MATH 0112, MATH 0306, MATH 0308, MATH 0312. The percentage of students attempting any developmental math course may be less than the sum of students attempting either MATH 306 (Fundamentals of Mathematics I) or MATH 308

The Learning Communities Demonstration

Appendix Table A.8

Houston Transcript Outcomes by Cohort, Credit and Persistence Measures

Learning Communities for Students in Developmental Math

Outcome	Early Cohorts				Late Cohorts				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Program semester									
Registered for any courses (%)	83.8	81.6	2.2	4.3	84.6	80.9	3.7	3.9	
Enrolled in a learning community (%)	70.0	0.5	69.5 ***	5.7	71.9	2.3	69.5 ***	5.0	
Number of credits attempted	7.7	7.8	-0.1	0.5	7.9	7.8	0.2	0.5	
Regular credits	3.3	3.4	-0.1	0.3	3.4	3.5	-0.2	0.3	
Developmental credits	4.4	4.4	0.0	0.4	4.6	4.3	0.3	0.3	
Number of credits earned	5.1	5.2	-0.1	0.4	5.5	5.2	0.3	0.4	
Regular credits	2.2	2.4	-0.2	0.2	2.4	2.5	-0.1	0.3	
Developmental credits	2.8	2.7	0.1	0.3	3.1	2.7	0.4	0.3	
First postprogram semester									
Registered for any courses (%)	56.9	59.4	-2.5	4.7	64.2	62.2	2.1	3.8	
Number of credits attempted	5.7	5.8	-0.1	0.5	6.2	6.0	0.2	0.4	
Regular credits	3.3	3.1	0.2	0.4	3.6	3.4	0.2	0.3	
Developmental credits	2.4	2.6	-0.2	0.3	2.6	2.5	0.1	0.2	
Number of credits earned	3.7	3.5	0.2	0.4	3.5	3.6	-0.1	0.3	
Regular credits	2.4	2.1	0.3	0.3	2.1	2.1	0.0	0.3	
Developmental credits	1.3	1.4	-0.1	0.2	1.3	1.5	-0.1	0.2	

(continued)

Appendix Table A.8 (continued)

Outcome	Early Cohorts: Program Group	Early Cohorts: Control Group	Early Cohorts: Difference (Impact)	Early Cohorts: Standard Error	Late Cohorts: Program Group	Late Cohorts: Control Group	Late Cohorts: Difference (Impact)	Late Cohorts: Standard Error	Difference Between Subgroups
Cumulative[a]									
Number of semesters registered for any courses	1.5	1.5	-0.1	0.1	1.5	1.5	0.1	0.1	
Number of credits attempted	13.7	14.2	-0.5	0.9	14.4	14.1	0.3	0.8	
Regular credits	6.8	6.8	0.0	0.6	7.0	7.1	0.0	0.6	
Developmental credits	6.9	7.4	-0.5	0.6	7.4	7.0	0.3	0.4	
Number of credits earned	8.9	9.1	-0.2	0.8	9.1	9.0	0.1	0.7	
Regular credits	4.7	4.7	0.0	0.5	4.6	4.7	-0.1	0.5	
Developmental credits	4.2	4.4	-0.2	0.4	4.5	4.3	0.2	0.4	
Sample size (total = 1,273)	339	229			422	283			

SOURCE: MDRC calculations from Houston Community College transcript data.

NOTES: "Early Cohorts" refers to the earlier cohorts at each campus to experience the learning communities program (Northline campus cohorts 2 and 3, Southeast campus cohorts 3 and 4, and Central campus cohort 4). "Late Cohorts" refers to the later cohorts at each campus to experience the learning communities program (Northline campus cohorts 4 and 5, Southeast campus cohort 5, and Central campus cohort 5).

Rounding may cause slight discrepancies in sums and differences.

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

A two-tailed t-test was applied to differences of impacts between subgroups. Statistical significance levels are indicated as: ††† = 1 percent; †† = 5 percent; † = 10 percent.

The probability of being assigned to the treatment group varies within random assignment cohorts, and estimates are weighted to account for the different random assignment ratios. Standard errors are clustered by learning community link.

Estimates are adjusted by cohort, campus, and score on the pre-algebra placement test at baseline.

All measures are based on courses that sample members are still enrolled in at the end of the add/drop period.

[a]Cumulative measures include courses taken from the program semester through the first postprogram semester, and include summer terms.

The Learning Communities Demonstration

Appendix Table A.9

Houston Transcript Outcomes by Gender, Math Progression

Learning Communities for Students in Developmental Math

Outcome (%)	Males				Females				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Program semester									
Fundamentals of Mathematics I									
Passed	44.5	33.8	10.7 **	5.2	58.7	43.4	15.3 ***	4.2	
Attempted but did not pass	25.5	30.0	-4.5	4.7	21.9	26.7	-4.8	3.2	
Did not attempt	29.9	36.1	-6.2	5.4	19.4	29.9	-10.5 ***	4.0	
College and Career Planning course									
Passed	49.7	49.1	0.6	5.4	64.2	54.6	9.6 **	4.0	
Attempted but did not pass	25.2	25.0	0.3	4.6	18.5	18.5	0.0	2.8	
Did not attempt	25.1	25.9	-0.9	5.1	17.3	26.9	-9.6 ***	3.7	†
First postprogram semester									
Fundamentals of Mathematics II									
Passed	11.6	10.3	1.3	3.2	16.6	13.2	3.4	2.4	
Attempted but did not pass	18.3	14.7	3.6	3.6	24.4	17.9	6.4 **	3.2	
Did not attempt	70.1	74.9	-4.9	4.4	59.1	68.9	-9.8 ***	3.7	
Cumulative[a]									
Any developmental math[b]									
Passed	52.3	45.4	6.9	5.3	64.1	52.8	11.2 ***	3.9	
Attempted but did not pass	27.9	35.3	-7.4	4.9	22.5	27.7	-5.3 *	3.1	
Did not attempt	19.8	19.3	0.5	4.5	13.5	19.4	-6.0 *	3.2	

(continued)

Appendix Table A.9 (continued)

Outcome	Males				Females				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Fundamentals of Mathematics I									
Passed	48.6	41.6	7.0	5.3	62.2	50.4	11.8 ***	4.0	
Attempted but did not pass	25.1	30.0	-5.0	4.7	20.9	26.8	-5.9 *	3.1	
Did not attempt	26.4	28.4	-2.0	5.0	16.9	22.8	-5.9	3.6	
Fundamentals of Mathematics II									
Passed	15.6	16.1	-0.5	3.5	18.9	15.4	3.6	2.5	
Attempted but did not pass	20.4	17.0	3.3	3.8	25.3	18.8	6.5 **	3.2	
Did not attempt	64.1	66.9	-2.9	4.7	55.7	65.8	-10.0 ***	3.6	
College and Career Planning course									
Passed	55.7	55.5	0.3	5.2	67.2	62.8	4.4	3.8	
Attempted but did not pass	23.9	22.7	1.2	4.3	18.4	16.8	1.6	2.7	
Did not attempt	20.3	21.9	-1.5	4.7	14.4	20.4	-6.0 *	3.3	
Sample size (total = 1,273)	264	160			497	352			

SOURCE: MDRC calculations from Houston Community College transcript data.

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

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

A two-tailed t-test was applied to differences of impacts between subgroups. Statistical significance levels are indicated as: ††† = 1 percent; †† = 5 percent; † = 10 percent.

The probability of being assigned to the treatment group varies within random assignment cohorts, and estimates are weighted to account for the different random assignment ratios. Standard errors are clustered by learning community link.

Estimates are adjusted by cohort, campus, and score on the pre-algebra placement test at baseline.

All measures are based on courses that sample members are still enrolled in at the end of the add/drop period.

[a]Cumulative measures include courses taken from the program semester through the first postprogram semester, and include summer terms.

[b]Includes MATH 0101, MATH 0102, MATH 0106, MATH 0108, MATH 0112, MATH 0306, MATH 0308, MATH 0312. The percentage of students attempting any developmental math course may be less than the sum of students attempting either MATH 306 (Fundamentals of Mathematics I) or MATH 308 (Fundamentals of Mathematics II) because some students enrolled in both MATH 306 and MATH 308.

The Learning Communities Demonstration

Appendix Table A.10

Houston Transcript Outcomes by Gender, Credit and Persistence Measures

Learning Communities for Students in Developmental Math

Outcome	Males				Females				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Program semester									
Registered for any courses (%)	78.0	83.9	-5.9	4.5	87.6	80.0	7.6 **	3.1	†††
Enrolled in a learning community (%)	63.0	2.5	60.5 ***	4.6	75.3	1.2	74.1 ***	3.7	†††
Number of credits attempted	7.1	7.6	-0.5	0.5	8.2	7.9	0.3	0.4	
Regular credits	2.8	3.5	-0.6 *	0.3	3.6	3.5	0.1	0.2	†
Developmental credits	4.3	4.2	0.1	0.3	4.6	4.4	0.2	0.3	
Number of credits earned	4.4	4.7	-0.4	0.5	5.8	5.4	0.3	0.3	
Regular credits	1.8	2.4	-0.6 **	0.3	2.6	2.5	0.0	0.2	†
Developmental credits	2.6	2.4	0.2	0.3	3.2	2.9	0.3	0.2	
First postprogram semester									
Registered for any courses (%)	51.2	57.1	-5.9	5.1	66.1	62.7	3.3	3.3	
Number of credits attempted	5.0	5.3	-0.3	0.5	6.5	6.2	0.3	0.4	
Regular credits	2.8	2.7	0.1	0.4	3.8	3.6	0.2	0.3	
Developmental credits	2.2	2.6	-0.4	0.3	2.7	2.6	0.1	0.2	
Number of credits earned	2.8	3.5	-0.7	0.4	3.9	3.7	0.3	0.3	†
Regular credits	1.7	1.8	-0.1	0.3	2.5	2.3	0.2	0.2	
Developmental credits	1.1	1.6	-0.6 **	0.2	1.4	1.4	0.0	0.2	††

(continued)

Appendix Table A.10 (continued)

Outcome	Males				Females				Difference Between Subgroups
	Program Group	Control Group	Difference (Impact)	Standard Error	Program Group	Control Group	Difference (Impact)	Standard Error	
Cumulative[a]									
Number of semesters registered for any courses	1.3	1.5	-0.2 *	0.1	1.6	1.5	0.1 *	0.1	†††
Number of credits attempted	12.3	13.5	-1.2	0.9	15.0	14.5	0.5	0.7	
Regular credits	5.7	6.3	-0.6	0.7	7.5	7.3	0.2	0.5	
Developmental credits	6.6	7.1	-0.6	0.6	7.5	7.2	0.2	0.4	
Number of credits earned	7.2	8.5	-1.3	0.8	9.9	9.4	0.5	0.6	†
Regular credits	3.5	4.3	-0.8	0.5	5.2	5.0	0.3	0.4	†
Developmental credits	3.7	4.2	-0.5	0.5	4.7	4.4	0.3	0.3	
Sample size (total = 1,273)	264	160			497	352			

SOURCE: MDRC calculations from Houston Community College transcript data.

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

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

A two-tailed t-test was applied to differences of impacts between subgroups. Statistical significance levels are indicated as: ††† = 1 percent; †† = 5 percent; † = 10 percent.

The probability of being assigned to the treatment group varies within random assignment cohorts, and estimates are weighted to account for the different random assignment ratios. Standard errors are clustered by learning community link.

Estimates are adjusted by cohort, campus, and score on the pre-algebra placement test at baseline.

All measures are based on courses that sample members are still enrolled in at the end of the add/drop period.

[a]Cumulative measures include courses taken from the program semester through the first postprogram semester, and include summer terms.

References

ACT, Inc. 2010. "COMPASS/ESL Sample Test Questions-A Guide for Students and Parents: Mathematics." Web site: http://www.act.org/compass/sample/pdf/numerical.pdf

Adams, Peter S., Gerhart R. Miller, and A. Roberts. 2009. "The Accelerated Learning Program: Throwing Open the Gates." *Journal of Basic Writing* 28, 2: 50-69.

Adams, William W. 2003. *Developmental Mathematics: A New Approach.* The Mathematical Association of America (MAA).
Web site: http://www.maa.org/features/112103devmath.html

Adelman, Clifford. 2004. *Principal Indicators of Student Academic Histories in Postsecondary Education, 1972-2000* Washington, DC: U.S. Department of Education, Institute of Education Sciences.

Asera, Rose. 2008. *Change and Sustain/Ability: A Program Director's Reflections on Institutional Learning*. Stanford, CA: The Carnegie Foundation for the Advancement of Teaching.

Attewell, Paul, David Lavin, Thurston Domina, and Tania Levey. 2006. "New Evidence on College Remediation." *Journal of Higher Education* 77, 5: 886-924.

Bailey, Thomas, Dong Wook Jeong, and Sung-Woo Cho. 2009. *Referral, Enrollment, and Completion in Developmental Education Sequences in Community* Colleges. CCRC Working Paper No. 15. New York: Community College Research Center, Teachers College, Columbia University.

Bloom, Howard S. 2006. *The Core Analytics of Randomized Experiments for Social Research. Working Paper.* New York: MDRC.

Boylan, Hunter R. 2002. *What Works: Research-Based Best Practices in Developmental Education*. Boone, NC: Continuous Quality Improvement Network/National Center for Developmental Education.

Brock, Tom. 2010. "Young Adults and Higher Education: Barriers and Breakthroughs to Success." *The Future of Children* 20, 1.

Bryck, Anthony S., and Uri Treisman. 2010. "Make Math a Gateway, Not a Gatekeeper. " *The Chronicle of Higher Education* (April 18, 2010).

Center for Student Success. 2007. *Basic Skills as a Foundation for Success in California Community Colleges.* Sacramento, CA: Center for Student Success: The Research and Planning Group of the California Community Colleges.

Desroches, Donna M., Colleen M. Lenthan, and Jane V. Wellman. 2010. Trends in College Spending 1998-2008: Where Does the Money Come From? Where Does It Go? What Does It Buy? Washington, DC: Delta Cost Project on Postsecondary Education Costs, Productivity and Accountability.

Engstrom, Cathy McHugh. 2008. "Curricular Learning Communities and Unprepared Students: How Faculty Can Provide a Foundation for Success." *New Directions for Teaching and Learning* 115: 5-19.

Engstrom, Cathy McHugh, and Vincent Tinto. 2008. "Learning Better Together: The Impact of Learning Communities on the Persistence of Low-Income Students." *Opportunity Matters* 1.

Fulton, Mary. 2010. *State Reports on the Cost of Remedial Education*. Denver: The Education Commission of the States.

Grubb, W. Norton. 1999. *Honored But Invisible: An Inside Look at Teaching in Community Colleges.* New York: Routledge.

Hoachlander, Gary, Anna C. Sikora, and Laura Horn. 2003. *Community College Students: Goals, Academic Preparation, and Outcomes*. Washington, DC: National Center for Education Statistics.

Jenkins, Davis, Matthew Zeidenberg, and Gregory S. Kienzl. 2009. *Building Bridges to Postsecondary Training for Low-Skill Adults: Outcomes of Washington State's I-BEST Program.* New York: Community College Research Center, Teachers College, Columbia University.

Jepsen, Christopher, Kenneth R. Troske, and Paul A. Coomes. 2008. *The Labor Market Returns for Community College Degrees, Diplomas, and Certificates. Working Paper*. Lexington, KY: University of Kentucky.

Johnson, Marianne, and Eric Kuennen. 2004. "Delaying Developmental Mathematics: The Characteristics and Costs." *Journal of Developmental Education* 28, 2: 24-29.

Kane, Thomas J., and Cecilia Elena Rouse. 1995. "Labor-Market Returns to Two- and Four-Year College." *American Economic Review* 85, 3: 600-614.

Knapp, Laura G., Janice E. Kelly-Reid, and Scott A. Ginder. 2009. *Enrollment in Postsecondary Institutions, Fall 2007; Graduation Rates, 2001 & 2004 Cohorts; and Financial Statistics, Fiscal Year 2007: First Look*. Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

Marcotte, David E. 2009. "The Earnings Effect of Education at Community Colleges." *Contemporary Economic Policy* 28, 1: 36-51.

Minkler, James. 2002. "ERIC Review: Learning Communities at the Community College." *Community College Review* 30, 3 46-63.

Prince, David, and Davis Jenkins. 2005. *Building Pathways to Success for Low-Skill Adult Students: Lessons for Community College Policy and Practice from a Statewide Longitudinal Tracking Study*. New York: Community College Research Center, Teachers College, Columbia University.

Queensborough Community College. 2010. *Fact Book 2010.*

Richburg-Hayes, Lashawn, Thomas Brock, Allen LeBlanc, Christina Paxson, Cecilia Elena Rouse, and Lisa Barrow. 2009. *Rewarding Persistence: Effects of a Performance-Based Scholarship Program for Low-Income Parents.* New York: MDRC.

Scrivener, Susan, Dan Bloom, Allen LeBlanc, Christina Paxson, Cecilia Elena Rouse, and Colleen Sommo. 2008. *A Good Start: Two-Year Effects of a Freshmen Learning Community Program at Kingsborough Community College*. New York: MDRC.

Scrivener, Susan, Colleen Sommo, and Herbert Collado. 2009. *Getting Back on Track: Effects of a Community College Program for Probationary Students*. New York: MDRC.

Smith, Barbara Leigh, Jean MacGregor, Roberta Matthews, and Faith Gabelnick. 2004. *Learning* Communities*: Reforming Undergraduate Education.* San Francisco: Jossey-Bass.

Tinto, Vincent. 1997. "Classrooms as Communities: Exploring the Educational Character of Student Persistence. " *Journal of Higher Education* 69: 599-623.

Tinto, Vincent, A. Goodsell-Love, and P. Russo. 1994. *Building Learning Communities for New College* Students*: A Summary of Research Findings of the Collaborative Learning Project*. University Park, PA: Pennsylvania State University, National Center on Postsecondary Teaching, Learning and Assessment.

U.S. Department of Education. 2007. *Integrated Postsecondary Education Data System (IPEDS) Files*. Washington, DC: Office of Educational Research and Improvement, National Center for Education Statistics, National Archives and Records Administration.

Visher, Mary G., Kristin F. Butcher, and Oscar S. Cerna. 2010. *Guiding Developmental Math Students to Campus Services: An Impact Evaluation of the Beacon Program at South Texas College.* New York: MDRC.

Visher, Mary G., Emily Schneider, Heather Wathington, and Herbert Collado. 2010. *Scaling Up Learning Communities: The Experience of Six Community Colleges*. New York: National Center for Postsecondary Research.

Visher, Mary G., Heather Wathington, Lashawn Richburg-Hayes, and Emily Schneider. 2008. The Learning Communities Demonstration: Rationale, Sites, and Research Design. An NCPR Working Paper. New York: National Center for Postsecondary Research.

Weiss, Michael J., Mary G. Visher, and Heather Wathington. 2010. *Learning Communities for Students in Developmental Reading: An Impact Study at Hillsborough Community College*. New York: National Center for Postsecondary Research.

Weissman, Evan, Oscar Cerna, Christian Geckeler, Emily Schneider, Derek V. Price, and Tom J. Smith. 2009. *Promoting Partnerships for Student Success: Lessons from the SSPIRE Initiative*. New York: MDRC.

Zachry, Elizabeth M. 2008. *Promising Instructional Reforms in Developmental Education: A Case Study of Three Achieving the Dream Colleges*. New York: MDRC.

RELATED PUBLICATIONS ON LEARNING COMMUNITIES

Learning Communities for Students in Developmental Reading
An Impact Study at Hillsborough Community College
NCPR, 2010. Michael J. Weiss, Mary G. Visher, Heather Wathington, with Jed Teres, Emily Schneider.

Scaling Up Learning Communities
The Experience of Six Community Colleges
NCPR, 2010. Mary G. Visher, Emily Schneider, Heather Wathington, Herbert Collado.

Case Studies of Three Community Colleges
The Policy and Practice of Assessing and Placing Students in Developmental Education Courses
An NCPR Working Paper (National Center for Postsecondary Research)
NCPR, 2010. Stephanie Safran, Mary G. Visher.

The Learning Communities Demonstration
Rationale, Sites, and Research Design
An NCPR Working Paper (National Center for Postsecondary Research)
NCPR, 2008. Mary G. Visher, Heather Wathington, Lashawn Richburg-Hayes, Emily Schneider, with Oscar Cerna, Christine Sansone, Michelle Ware.

A Good Start
Two-Year Effects of a Freshmen Learning Community Program at Kingsborough Community College
MDRC, 2008. Susan Scrivener, Dan Bloom, Allen LeBlanc, Christina Paxson, Cecilia Elena Rouse, Colleen Sommo.

Building Learning Communities
Early Results from the Opening Doors Demonstration at Kingsborough Community College
MDRC, 2005. Dan Bloom, Colleen Sommo.

Learning Communities and Student Success in Postsecondary Education: A Background Paper.
MDRC, 2005. Derek V. Price, Malisa Lee.

NOTE: All the publications listed above are available for free download at www.mdrc.org