



Learning Communities for Students in Developmental Math

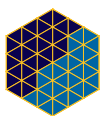
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and Houston Community Colleges

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FEBRUARY 2011

THE LEARNING
COMMUNITIES
DEMONSTRATION

Executive Summary



National Center for Postsecondary Research
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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.

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

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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 Post-secondary 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.

¹MDRC, 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 (RA305A060010) 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.

²For 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.

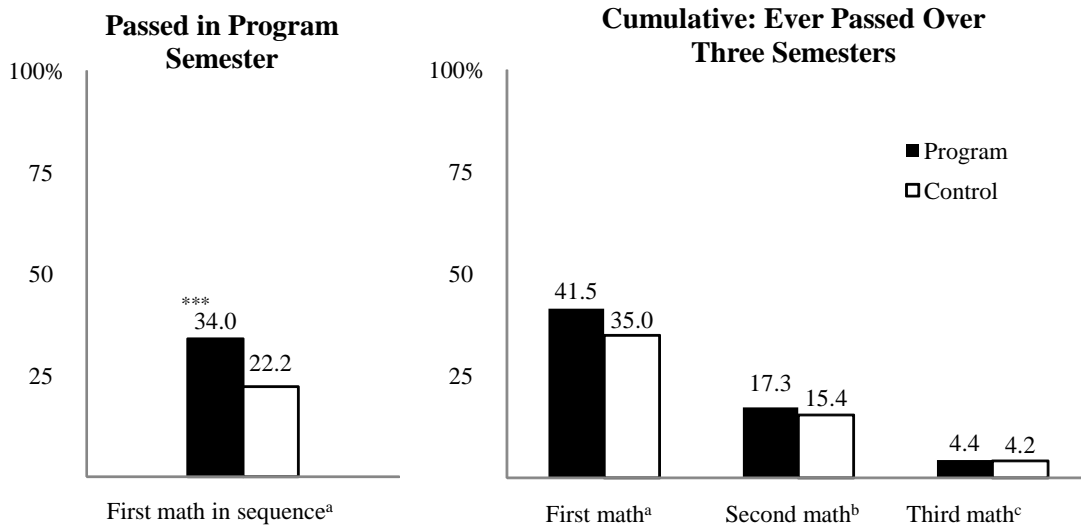
Students in the learning communities at both colleges also passed developmental math at higher rates than their control group counterparts, an important first step toward further success. These pass rates are compared in the first set of bars in Figures ES.1 and ES.2. At Queensborough, this result was 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.

^aIncludes MATH 005 for those placed into MATH 005 at baseline. Includes MATH 010 and MATH 013 for those placed into MATH 010/013.

^bIncludes 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.

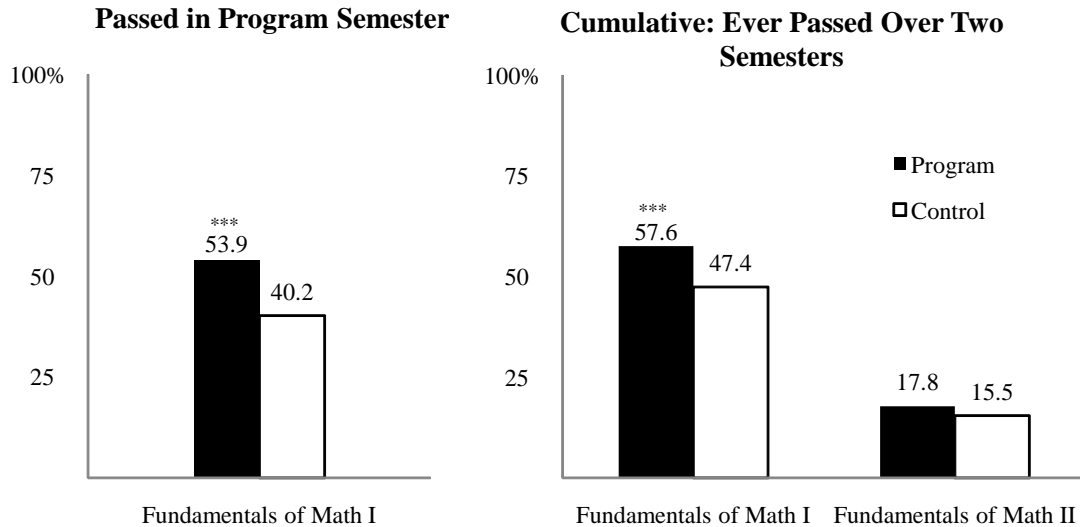
^cIncludes MATH 114, 120, 301, and 321 for those placed into MATH 005 at baseline. Includes MATH 128, 260, 303, 336, and 440 for those placed into MATH 010/013.

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.

