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# Corequisite Remediation in Mathematics

A Review of First-Year Implementation and Outcomes of  
Quantway and Statway

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# Introduction

Increasingly, higher education systems and institutions across the country are overhauling their traditional placement processes for determining whether students are ready for college-level courses in mathematics or English. In doing so, they are also revisiting the role of developmental education for students who are not considered ready.<sup>1</sup> As a result, many students who would previously have been required to take, and succeed in, developmental coursework *before* being allowed to take college-level math or English are now being placed directly into such courses and given concurrent remedial support. This approach — known as developmental *corequisite remediation* — pairs a college-level course with a developmental-level corequisite course that provides additional supports to help ensure that students can pass the college-level course. Compared to students having to work their way through one or more developmental courses before being given a chance to even enroll in a college-level class, corequisite remediation significantly decreases the time required in order for students to take and succeed in a college-level course. In doing so, this new approach has the potential to increase students' overall college success.<sup>2</sup>

Carnegie Math Pathways (CMP) has responded to the changing landscape of developmental education by creating two offerings based on this new approach: Quantway College with Corequisite and Statway College with Corequisite, teaching quantitative reasoning and statistics, respectively. Each is designed as a one-term stand-alone course set: a college-level course with some embedded learning supports and a

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<sup>1</sup> Mangan, K. (2019, February 18). The end of the remedial course. *The Chronicle of Higher Education*. Retrieved from <https://www.chronicle.com/interactives/Trend19-Remediation-Main>.

<sup>2</sup> Complete College America. (2016). *Corequisite remediation: Spanning the completion divide – Breakthrough results fulfilling the promise of college access for underprepared students*. Retrieved from <http://completecollege.org/spanningthedivide/>

corresponding corequisite course that provides learners with additional support. Each course in the set is built on the successful design of CMP's original pathway courses, Quantway Pathway and Statway Pathway.

CMPs corequisite offerings were piloted at two institutions in spring 2018 and were made fully available in fall 2018, for the 2018/19 school year. Counting the institutions that piloted the courses and those that offered the courses starting in the fall, six institutions across the nation implemented one of the new offerings during this extended period. Between them, the two offerings were delivered by 15 faculty across 21 sections, reaching 410 students. Of the 410 students, 65.1 percent earned a grade of C or better, thereby gaining college-level math credit in a single term.

This brief examines the experiences of faculty and students across the six institutions; explores the elements of successful implementation, such as number of contact hours, use of cohort models, and faculty preparedness; and discusses implementation challenges, including managing class time and supporting students with varied levels of reading and of foundational math knowledge. Finally, it provides suggestions for improvement in the ongoing enhancement of these offerings, such as streamlining materials and building mechanisms for faculty support, and identifies how CMP plans to respond to those suggestions.

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# Moving from Pathways to a Corequisite Model for Quantway and Statway

Since 2011, CMP has helped spur innovation in how mathematics is taught in college, by demonstrating that, with the right supports, incoming students who have traditionally been deemed as needing remediation can be highly successful in college-level<sup>3</sup> quantitative reasoning and statistics.<sup>4</sup> Quantway Pathway and Statway Pathway, CMP's two-term alternative math pathways, integrate developmental-level and college-level content across two terms. These pathways have proven to be highly effective in helping students who would otherwise have been put into a developmental math sequence to, instead,

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<sup>3</sup> College-level courses are typically, though not always, credit-bearing, as opposed to stand-alone developmental courses, for which students typically do not earn college credit. College credits may or may not be transferable, depending on the transfer policies of the receiving institution.

<sup>4</sup> Huang, M. (2018). *2016–2017 impact report: Six years of results from the Carnegie Math Pathways*. Stanford, CA: Carnegie Foundation for the Advancement of Teaching, and San Francisco, CA: Carnegie Math Pathways @ WestEd. Retrieved from <https://carnegiemathpathways.org/reports/>

move directly into — and succeed in — college-level math. To date, in 96 institutions of higher education throughout the country, students in these two pathways have earned college-level math credit at roughly triple the rate, and in half the time, of students in a traditional developmental math sequence.<sup>5</sup>

With many states’ revisiting the role of developmental education, CMP sought to develop a solution for institutions that, due to new state policies, needed a corequisite course structure, or that simply wanted to offer students an even faster pathway to success in college-level math. CMP’s two new offerings, based on the corequisite remediation model, include all of the design principles that have made Quantway Pathway and Statway Pathway so successful, but were conceived, and designed, as one-term courses. In addition to letting students earn college credit more quickly, the one-term nature of the new offerings eliminates the between-term gap that, for some students, has served as an off-ramp from the math track by allowing them to simply not enroll in subsequent courses.

## Building on Success

Key to the effectiveness of Quantway Pathway and Statway Pathway is their research-based pedagogical design. Specifically, the pedagogy centers on active, collaborative learning within rich, authentic contexts. Situating math content and concepts in contexts that are relevant to students’ lives is critical to increasing student engagement, so these pathways use themes such as citizenship, personal finance, medical literacy, and social justice. Another critical aspect of the pedagogy is the use of small groups through which students engage together in productive struggle to make sense of, and identify connections between, the mathematics concepts. The pathways also incorporate productive persistence interventions — a broad array of supports intended to improve a student’s mindset, sense of belonging, and other non-cognitive factors associated with persistence and success in academic learning.<sup>6</sup>

In building the new corequisite offerings, CMP adhered to the original design principles underlying its pathway courses, believing that such adherence was essential for student success. Thus, both courses in each offering — that is, the college-level course and the developmental-level corequisite — use the pedagogy and learning supports used in CMP’s original pathway courses.<sup>7</sup>

Unlike the two-term pathway courses, the new corequisite pairs are designed as one-term offerings, which means that learning must take place in a shorter time frame. The college-level courses in the corequisite pairs were designed as standard three-unit, 16-week courses. Students who are ready for college-level math and for the faster learning pace of a one-term course can take the college-level course on its own. Students needing a greater degree of support in order to succeed can take both

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<sup>5</sup> Huang (2018).

<sup>6</sup> Silva, E., & White, T. (2013). *Pathways to improvement: Using psychological strategies to help college students master developmental math*. Stanford, CA: Carnegie Foundation for the Advancement of Teaching. Retrieved from <https://carnegiemathpathways.org/reports/>

<sup>7</sup> Sample curricula and learning outcomes that include the main concepts for each lesson are available at <https://carnegiemathpathways.org/explore-the-pathways/>.

courses simultaneously. The developmental-level courses were conceived for flexible use, according to different institution-specific implementation strategies, such as time allowed for the course, which can range from one to four contact hours.

Recognizing that some students would be ready for one of the college-level courses on its own, CMP also envisioned the need for flexibility in an institution’s approach to enrollment. Institutions can choose to use separate enrollment for the college-level and developmental-level courses (thus allowing some students to take just the college-level course) or they may use a single enrollment requiring both components for all students who enroll.

The materials (e.g., student lessons, instructor notes, and assessments) for all four courses — two college-level courses and two developmental-level courses — were developed by the CMP Curriculum Committee, a group of 12 faculty with experience teaching Statway/Quantway from 10 institutions across the country, with support and guidance from CMP staff. The committee surveyed faculty in each institution in the CMP network to ensure that all appropriate learning outcomes were included in each course. The committee then selected and wrote lessons and problem situations that cover the required concepts and that allow for the kinds of student discussion and discovery that make CMP courses unique.

The materials for the developmental-level course include suggested alignment to the lessons in the college-level course, but to give faculty more time for catch-up or review, some college-level lessons intentionally have no corresponding developmental-level materials. The college-level and developmental-level courses also includes optional lessons to address the specific course requirements of different state systems and institutions. Faculty have the flexibility to only use key lessons in both courses, or even pieces of lessons, that match their highest-priority learning outcomes. Developmental-level lessons were designed to be independent of each other, so faculty can skip lessons due to time constraints or if the lessons contain learning outcomes that are not required for their course.

## Implementing the New Courses

Across the first two terms during which the new course offerings were implemented — spring 2018 and fall 2018 — three institutions offered a total of eight sections of Quantway College with Corequisite, and three institutions offered a total of 13 sections of Statway College with Corequisite, collectively enrolling 410 students who remained enrolled beyond the drop date.

Approaches to implementation (e.g., contact hours for the developmental-level course, credit awarded, and placement<sup>8</sup>) varied across the institutions. For example, the total number of contact hours (for the paired courses) assigned by the implementing institution ranged from four to six. (More contact hours for the corequisite course typically means more frequent class sessions throughout the week.) A short

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<sup>8</sup> Each institution employed its own placement methodology to determine whether a student required remediation. The CMP courses do not stipulate specific methods to determine whether a student is required to enroll in the developmental-level corequisite course.

summary of the implementation approaches taken by each of the six institutions implementing the new course offerings in fall 2018 follows; to preserve anonymity, each institution is referred to solely by an assigned letter, A through F.

Institution A, a two-year college, moved to a corequisite model because its faculty and administrators felt that too many students were getting lost in the transition between math courses in the college's existing developmental sequence. They also recognized that pairing developmental-level learning with the college-level course could give faculty a better opportunity to address students' learning needs. Institution A offered Quantway College with Corequisite as a three-contact-hour college-level course paired with a three-contact-hour developmental-level course, for a total of six credits, three of them at the college level. The courses were available only to students needing developmental support.

Institution B is a four-year institution in a state that is eliminating funding for remedial courses other than at two-year institutions. As a result, Institution B was phasing out all remedial courses. To meet the needs of students who placed into developmental mathematics, it offered Quantway College with Corequisite as a six-contact-hour course, with no separate enrollment for the developmental-level component. The combined course offering provided a total of five credits, four of them at the college level. The course was available only to students needing developmental support.

Institution C is a four-year institution that, in fall 2018, did not offer any non-corequisite developmental math courses, because such courses would not satisfy requirements either for general education or for specific majors. It offered Quantway College with Corequisite as a way to provide additional support to students in college-level courses who needed it. The corequisite course was offered as a four-contact-hour course, providing three college-level credits. The course was available only to students needing developmental support.

Institution D, a two-year college, offered Statway College with Corequisite in response to recent state policy changes that require institutions to enroll developmental students in corequisite courses. Institution D offered a three-contact-hour college-level course paired with a three-contact-hour developmental-level course. The courses provided students a total of six credits, three of them at the college level. The courses were available only to students needing developmental support.

Institution E, a two-year college, offered Statway College with Corequisite as a means of reducing the number of contact hours required to complete college-level math for students needing developmental support, compared to the college's implementation of Statway Pathway. Statway College with Corequisite was offered over two quarters, with five contact hours in each quarter (which in this report is being treated as equivalent to a total of 5 semester contact hours), whereas Statway Pathway had been offered over two quarters, with 10 contact hours in each quarter. The first quarter of Statway College with Corequisite provided five non-college-level units, and the second provided five college-level units (with five units being equivalent to 3.33 semester credits<sup>9</sup>). The combined course offering was available only to students needing developmental support.

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<sup>9</sup> Cal Poly Pomona. (n.d.). *Semester conversion: Unit converter*. Retrieved from <https://www.cpp.edu/~semester/unit-converter-tool.shtml>



Institution F, a two-year college, offered Statway College with Corequisite as a means to ensure that all incoming students, regardless of their math or English placement, were able to complete a college-level course within their first year. It offered the college-level course as a three-unit, three-contact-hour course, for which students would earn three college-level credits, and paired it with the two-unit, two-contact-hour developmental-level course, for which students could earn two pre-college credits. The corequisite course was required for students who placed at the developmental level, but was available to any student desiring the additional support it offered.

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## Methods for This Review

During the first two terms in which Quantway College with Corequisite and Statway College with Corequisite were offered — that is, spring 2018 and fall 2018 — CMP staff collected data on course implementation, student performance, and faculty and student experiences from the six implementing institutions. All 15 faculty who taught these courses provided student performance data at the end of each course, including final grades in the college-level course and numbers of withdrawals and incompletes. These data were provided for all 410 students enrolled in these courses beyond the institutions' course drop dates. One faculty member at each implementing institution provided the implementation data for the course sections at that institution, including numbers of contact hours and credits for the college-level and developmental-level corequisite courses. CMP also facilitated three discussions via video chat, with two to four faculty members in each, sharing their ongoing implementation, teaching strategies, and challenges. During these 60-90-minute discussions, faculty also informally provided feedback from their students. In addition, five students completed an optional survey designed to gather their perspectives about the courses and the implementation of the courses.

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## Results From the Review

### Success Rates

Of the 410 students who participated in these new corequisite offerings at the six colleges, 65.1 percent were successful (i.e., achieving a grade of C or better), earning college-level math or statistics credit in a single term (see table 1 on following page). This percentage of students earning college-level math or statistics credit is substantially higher than the percentage of credit-earning students who had to engage in the traditional sequence of developmental courses followed by a college-level course. Research has

shown that only 31 percent of students who are placed in a traditional developmental math sequence complete their required developmental course(s) within three years. Additionally, only 20 percent of students who are put into a traditional developmental math sequence earn college-level math credit within three years, and only 6 percent achieve college-level math credit within a single year.<sup>10</sup> Even though, for the implementation of CMP's new offerings, success rates varied by institution and (within institutions that offered multiple sections) by section, success rates at each institution exceeded the success rates for students in a traditional developmental math sequence, as previously described.

The overall success rate for students in Quantway College with Corequisite was 79 percent (83 percent at Institution A, 89 percent at Institution B, and 39 percent at Institution C).<sup>11</sup> At Institution A, the only institution to have multiple sections of Quantway College with Corequisite, section-specific success rates ranged from 65 percent to 100 percent, with a standard deviation of 13 percent.

The overall success rate for students in Statway College with Corequisite was 54 percent (52 percent at Institution D, 66 percent at Institution E, and 50 percent at Institution F).<sup>12</sup> At Institution D, the only institution to have multiple sections of Statway College with Corequisite, section-specific success rates ranged from 18 percent to 78 percent, with a standard deviation of 19 percent.

Across all 21 sections of Quantway College with Corequisite and Statway College with Corequisite combined, 12 sections had a success rate of 65 percent or higher.

For the two institutions with multiple course sections (Institutions A and D), the variability within each institution (standard deviations of 13 percent and 19 percent, respectively) was slightly less than the variability between institutions (standard deviation of 20 percent).

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<sup>10</sup> Huang (2018).

<sup>11</sup> This overall success rate was calculated as the total number of successful students in Quantway College with Corequisite (C or better in the college-level course) divided by the total number of students in Quantway College with Corequisite.

<sup>12</sup> This overall success rate was calculated as the total number of successful students in Statway College with Corequisite (C or better in the college-level course) divided by the total number of students in Statway College with Corequisite.



**Table 1. Implementation and Success Rates in the First Year of Quantway College with Corequisite and Statway College with Corequisite**

	Pathway	Number of Students (# of Sections)	Total Contact Hours (for Paired Courses)	Corequisite Success Rate	Standard Deviation across Sections (Range)
Institution A	Quantway	149 (6)	6	83%	13% (65%–100%)
Institution B	Quantway	18 (1)	6	89%	N/A
Institution C	Quantway	18 (1)	4	39%	N/A
Institution D	Statway	184 (11)	6	52%	19% (18%–78%)
Institution E	Statway	29 (1)	5 per quarter for a two-quarter course	66%	N/A
Institution F	Statway	12 (1)	5	50%	N/A

## Student and Faculty Experience

A key intended benefit of the corequisite model for students is to reduce the time that students take to earn a degree. One student summarized it nicely: “I was able to get the credits I needed within one class, instead of having to go from classroom to classroom.” Another echoed this sentiment, stating, “I love the fact that I’m learning things I needed to relearn, while also learning new material.”

Additionally, Quantway College with Corequisite and Statway College with Corequisite provide learning opportunities and outcomes through their curricular design and pedagogical approach. One faculty member wrote that students were “clearly seeing connections” between the college-level course and the developmental-level corequisite course, and that the corequisite course “often provides more practice, and sometimes bears deeper into the concepts [of the college-level course].” Another faculty member noted, “I enjoyed how the Quantway curriculum focused on topics and examples that are current and relevant to life.” A third faculty member stated, “I liked being able to observe my students’ thought process. Often, the misconception they held was not the one I would have thought [they had] if I [all I saw as] their finished work.” This faculty member also noted that “the class came together as a learning community in ways I have not seen in classes taught using a lecture model. Students were more engaged with the material and in each other’s success.” Students also noticed the benefits of the pedagogical approach, with one noting that the best part of the class was “the hands-on learning.”

## Contributing Factors to Appeal and Success of Offerings

Survey results and other feedback from faculty and students participating in the courses indicate strong support for the model and appreciation for the particular curricular and pedagogical designs of Quantway College with Corequisite and Statway College with Corequisite. In particular, the data pointed to the following aspects of the offerings as key to the appeal and/or success of the corequisite model:

### Faster Completion

With the exception of students enrolled at Institution E, where the paired courses were implemented across two quarters, all successful students earned college-level math credit in one term. This is at least one term shorter than would be required for students enrolled in other pathway models, including Quantway Pathway and Statway Pathway, or in the traditional model consisting of a series of developmental math courses followed by a college-level course. Faculty noted that this shortened time frame for earning credits reduces the likelihood of students giving up on math and failing to enroll in the next course or, in some instances, leaving school (e.g., between terms, as they move from one developmental-level course to another before completing a credit-bearing college-level course). Faculty also noted that the shortened time frame forestalls potential disruptions, of learning patterns and social supports, that may be caused by changing instructors, peer groups, or course schedules across terms.

### CMP's Instructional Approach

As previously described, the paired courses are taught using student-centered pedagogy that engages students in actively and collaboratively solving problems within rich, authentic contexts. Faculty noted that this innovative learning approach was a new experience for many students and that some students were initially resistant to having to productively struggle in groups, with minimal instructor support. But once students adapted to this instructional approach, they were better able to engage in the content and to learn deeply. Seeing the value in discovery and making connections with math concepts on their own, students thrived with the CMP pedagogy. Faculty also observed that the social-emotional supports embedded in the paired courses helped develop students' persistence and their learning strategies, while also nurturing a sense of community and belonging in the classroom.

### More Contact Hours

There appears to be a connection between the total number of contact hours assigned to the paired courses and student success in the courses (see table 2 on page 10). Three of the four highest institutional success rates for the new course offering came from the institutions with six contact hours, and the lowest institutional success rate was from the institution with four contact hours.

**Table 2. Contact Hours and Success Rate**

Institution's Total Contact Hours	Corequisite Success Rate
4	39%
5	61%
6	67%

### Cohort Model

All institutions used a cohort model for course delivery, with the same faculty member teaching each of the paired courses (college-level and developmental-level) to the same group of students. Faculty noted that they felt that this approach was important for student comfort, consistent social support, continuity of pedagogical approaches, and their ability to make ongoing adjustments to the course's content and timeline as needed. However, since no other strategies were attempted, the effect of using the cohort strategy versus other strategies need further investigation.

### Faculty Preparation

Faculty time for preparation is an important contributor to student success. To help tailor the timelines of the paired courses to fit their institutions' implementation strategies and required learning outcomes, and to address the specific needs of their students, faculty need time to review all lessons and identify any lessons that they will not need. Having time to prepare, or having prior experience with any CMP curricula, can build faculty's familiarity with the pedagogy and the materials, which allows them to more quickly adapt lessons if needed. Several of the faculty from the institutions with higher success rates had years of experience teaching Quantway Pathway or Statway Pathway courses. This experience was helpful to them because, although the corequisite offerings were new, much of the pedagogy and many of the materials were drawn from the Quantway Pathway and Statway Pathway, CMP's original pathway courses. Faculty at two of the high-achieving institutions had also been involved in development of the corequisite materials. For that reason, compared to other faculty teaching one of the new offerings, these faculty were much more familiar with the materials and had had more time to consider their approaches to the courses. Overall, faculty reported their belief that any instructor — regardless of their level of past experience with CMP — could teach the course effectively the first time, but that new users, in particular, may need ample preparation time or additional supports, such as a faculty mentor.

### Faculty Support and Collaboration

Faculty at the two institutions offering multiple sections of the new courses mentioned that working collaboratively to support one another was a key to student success. Faculty at each of these institutions

held weekly meetings to learn from one another about what was or was not working in the course. At one of the institutions, faculty would regularly visit other classrooms to learn from one another. The collaborations allowed the faculty to adjust components of the course, including lessons, homework, and exams, and to continuously improve their strategies throughout a term.

## Student Expectations and Encouragement

Faculty also recommended that course expectations for students be set early and then reinforced, so that students clearly understand, for example, the number of hours and the types of work that the course requires, both in class and at home. One faculty member noted that “students just need reminders that it is a big workload and [that] they can handle it.” Faculty noted the importance of making clear to students that, if they are to succeed, they will need to routinely complete all at-home work, since students who did not do so undermined more than their own success: when students came to class less prepared, they slowed down the pace of the lessons and, thus, slowed down the overall course.

Faculty felt that the corequisite course structure may be new, and may seem daunting, to students, so helping students gain a realistic and positive mindset about the course may increase their success. One faculty member noted the importance of finding meaningful ways to encourage students, such as reminding them, throughout the course, how much progress they have made.

## Challenges and Suggestions for Improvement

Along with describing what they felt worked about the corequisite model, faculty and students pointed to some challenges and made some suggestions for improvement.

### The Importance of Adequate Time

The chief challenge identified by both faculty and students was having too little time available for student learning. Describing the four-contact-hour implementation strategy used at Institution C, a faculty member volunteered that “we just didn’t allow ourselves enough time. . . . it was a challenge to get [students] brushed up on their basic skills so that they could do the more challenging problems in the curriculum.” Even the faculty whose courses had the highest number of contact hours (six) reported that they struggled with time constraints, and that those constraints led all faculty at their institution to revise how they utilized the lessons in each course. Particular challenges and recommendations were identified in the areas of assessment, lesson/content selection, and pedagogy.

1. **Assessment:** The fast pace of the learning created a tension between the need to assess frequently and the limited time available for the course pair. While assessment, particularly early assessment of students’ developmental needs, is critical, faculty strongly cautioned against over-assessing, and encouraged faculty to pay careful attention to when and how frequently assessments are administered.

2. Lesson/content selection: Time constraints led faculty to revise how they utilized the developmental-level lessons. For most, this meant focusing primarily on the college lessons and using developmental-level lessons only as time allowed. One instructor noted that she “felt panicked at first and gave up trying to squeeze in the [developmental-level lessons] but started to feel better focusing on the college level [lessons].” Another instructor noted that she and her colleagues cut out any developmental material that was not absolutely critical for students’ success in achieving the college-level learning outcomes. Multiple faculty used significant time that had been designated for corequisite learning to continue working on the college materials. Faculty expressed their belief that anyone teaching paired courses using a corequisite model will need ample time, before each course pair starts, to select lessons and structure their course timelines to fit the local implementation configuration and to match the needs of their student populations.
3. Pedagogy: Time constraints also led faculty to adjust their pedagogical approaches, to reduce time for collaboration, exploration, and discovery, and, instead, to use a greater amount of direct instruction. Faculty noted that they had to carefully select which of the curriculum’s rich tasks and collaborative activities they could allow students to fully explore. One faculty member explained that learning through productive struggle often took longer than expected, so, to manage class time, faculty found themselves returning to a lecture format and guiding students’ learning themselves. One faculty member stated that he and his colleagues were teaching “a modified version where we did not go fully into the lessons. We’ve been picking and choosing pieces.”

## **The Ripple Effects of Student Reading Level and Foundational Math Knowledge**

Faculty noted that the pace of the paired courses and the rigor of the college-level material could be challenging for some students. Students requiring developmental-level mathematics entered these courses with a range of knowledge and skills, and those with the lowest levels of math proficiency naturally struggled the most. More surprising, to some extent, was the influence on student success of students’ reading proficiency levels. Students with weaker reading skills struggled with the volume of text and the reading level of the course material, which slowed the pace of instruction.

To address this challenge, a few faculty slowed the pace of the first series of lessons, and these faculty suggested that others do so as well. Reducing the pace of a course in the first week or two allowed students to become comfortable with the workload and demands of the course. It also allowed students to become familiar with the new learning strategies and course design, while also providing more opportunity for faculty to recognize the areas in which students were struggling and to begin shoring up instruction in those areas.

Additionally, some faculty suggested that students might struggle less if they could progress through their developmental reading courses first, prior to enrolling in mathematics corequisite courses.

## The Importance of Faculty Preparation and Support

All responding faculty noted that they could have benefited from more time to consider which material to cover and which material would not be covered. Faculty also felt that trainings could be helpful, particularly if the trainings focused on how to quicken the pace of the course without compromising the student-centered pedagogy embedded in the curriculum. Additionally, faculty were consistent in their desire for more supports while teaching the course, such as user guides and opportunities for collaboration or forums with other faculty, as discussed in the following section.

## Next Steps

The implementation of Quantway College with Corequisite and Statway College with Corequisite in 2018 provided important lessons that can guide future implementation and development efforts. With input from faculty, the following steps for improvement have been identified and will be implemented by CMP and its network.

### Streamline Materials

Given the significant time demands of, and constraints on, these courses, course developers must further streamline the curricular materials and identify essential elements. Preserving the pedagogical practices of active collaborative learning, centered on rich, authentic contexts that are critical for student success, will be important in any streamlining effort.

### Offer Greater Faculty Support

*Training.* While the CMP program currently provides a comprehensive faculty preparation program that includes online training, peer-to-peer mentoring, and in-person workshops, additional supports, specific to corequisite implementation, will be developed to assist faculty in navigating the challenges that are unique to this type of course.

*User Guides.* Instructional user guides, including comprehensive descriptions and examples of how others have taught these courses, as well as explanations of what works and how, would be valuable for faculty to have. CMP will develop guides that specify how to tailor materials to fit into the various combinations of contact hours for each course component. The guides will also discuss how, in light of time constraints, to maintain the pedagogical approach and to best utilize assessments and time for review.

*Faculty Collaboration.* Faculty consistently expressed the importance of having collaborative space for sharing strategies and resources with others, within and outside their institutions, who are also teaching corequisite courses. For faculty engaged in implementing corequisite courses, CMP will help develop a specific virtual space that utilizes voice and video communication functionality, is moderated to elevate consistent themes and learnings, and includes regular check-ins for discussion on particular topics.



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# Conclusion

This report illustrates how CMP's corequisite remediation courses can provide an effective alternative to traditional remediation and to earlier pathways models. Results show that average success rates for completing college-level math through these new courses are roughly triple those of traditional remediation<sup>13</sup> and are achieved in less than a quarter of the time. Outcomes varied across and within institutions, suggesting important areas for further study, such as examinations of the effect of faculty preparation on outcomes and the impacts of course structure (e.g., number of contact hours) on outcomes. However, the results generally demonstrate that the corequisite model can yield high success rates for students.

This report also presents student and faculty experiences with CMP's corequisite model. The successes and challenges detailed in this report indicate particular considerations for institutions contemplating implementation of a corequisite model, as well as suggestions for improving course materials and faculty support programs for those using CMP offerings. For example, while there may be administrative and logistical challenges associated with using more contact hours (e.g., six versus four), the evidence in this report shows a relationship between the number of total contact hours and student success rates, and faculty from many implementing colleges advise having at least six contact hours. Two of the institutions described in this report are in the process of adjusting their implementation strategies to allow for more contact hours, because they see having a higher number of contact hours as a critical factor in their students' success.

The CMP Networked Improvement Community, comprising faculty, administrators, and CMP will continue to work collectively and iteratively to improve these courses — through both improved implementation support and improved instructional support — in order to maximize student success.

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<sup>13</sup> Huang (2018).