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## Chapter 9

### **The Grass Grows Green in Virginia:**

#### A Grassroots Effort Leading to Comprehensive Change in Removing Mathematics Barriers for Students

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#### **Abstract**

The Virginia Community College System (VCCS) embarked on a comprehensive mathematics pathways project in October 2015 with a move from design to implementation in Spring 2017. The VCCS Mathematics Pathways Project (VMPP) aimed not only to develop strategies to improve retention and completion, but also to address foundational barriers to students' success. This grassroots effort involved collaboration among all 23 community colleges, over 200 mathematics faculty, and staff from career and technical support departments. Collaboration extended to the K–12 and university sectors, professional organizations, publishers, and foundations. VMPP goals focused on creating structured mathematics pathway courses for all program levels, implementing co-requisite opportunities for students, collaborating with K–12 and four-year institutions regarding mathematics readiness, developing multiple measures of placement, and improving Virginia's placement instruments. While the decisions made throughout this project were informed by research, the focus of this discussion is how Virginia's organization, processes, stakeholder collaboration, and communication laid the foundation to successfully implement this comprehensive project at scale.

## Introduction

Institutions of higher learning across the country face a multitude of challenges in regard to student degree completion. One major barrier is students' completion of the required mathematics for their program of study. A number of states have been addressing these issues through a combination of structured pathways, co-requisite models, early collaboration with high schools, and/or improved placement practices. The Commonwealth of Virginia aspired to address these areas in a statewide remodel of its mathematics program using a representative workgroup model with strong communication. The success of this work depended heavily upon a consistent infrastructure that included structural organization and processes, plans for stakeholder involvement, plans for strategic and broad communication, and an aggressive timeline for implementation. As with any major project, reflection on the project provided great insight into what was achieved and what lessons were learned.

The Virginia Community College System (VCCS) embarked on a comprehensive mathematics pathways project in October 2015 with a move from design to implementation in Spring 2017. The VCCS Mathematics Pathways Project (VMPP) aimed not only to develop strategies to improve retention and completion, but also to address foundational barriers to students' success. This grassroots effort involved collaboration among all 23 community colleges, over 200 mathematics faculty, and staff from career and technical support departments. In sharing the activities, organization, and processes involved in designing and implementing a statewide initiative, this chapter seeks to provide guidance to other faculty, institutions, and policymakers in creating their own agenda and strategies for change.

## A Case for Change: Virginia's Complete 2021

In Virginia, the 23 community colleges operate under one state system. Over the last 50 years, each community college has operated autonomously to meet their sister universities' and nearby workforce's needs, resulting in a repetitive and poorly defined master course file and inconsistency in transferability to the Commonwealth's 15 public and 24 private universities. As a result, advising students became almost impossible for colleges, leaving students to flounder in course selection, particularly in mathematics. In 2015, the VCCS Chancellor challenged the community colleges to triple the number of credentials completed by students attending its colleges. The new strategic plan, Complete 2021, focused on degree completion and better course options and selection to increase economic mobility and individual prosperity across the Commonwealth.

Success in mathematics is one of the biggest barriers to students' college completion (Complete College America, 2017). Virginia's data do not stray far from the national data indicating the same trends. In the VCCS, 37.7 percent of first-time-in-college (FTIC) associate degree-seeking students are placed into the lowest level developmental mathematics modules. Of these, only 14 percent complete a college-level mathematics course within four semesters. Only 14.5 percent of students taking any developmental coursework complete a degree or certificate within three years (State Council of Higher Education for Virginia, 2017). Success of the students in mathematics needed to become part of the solution to Complete 2021.

Mathematics faculty were called into action. Having identified student completion in mathematics as one of the biggest barriers to student success, the Chancellor challenged the mathematics faculty to be part of the

solution. The charge was simply stated by the VCCS Assistant-Vice Chancellor: “We have a problem; help us fix this.” In Fall 2015, the VCCS mathematics faculty joined forces and over the next two years defined, designed, and prepared for implementation of the mathematics pathways project. A true grassroots effort, the mission of VMPP was to improve student success in developmental mathematics through gateway mathematics courses by reducing the time to completion with increased success and greater levels of rigor. Faculty designed, system supported—here is our story.

### Laying the Groundwork: Getting Started

The process began in October 2015 with an all-day meeting, convened by the project manager, and included the VCCS Vice-Chancellor, the Assistant-Vice Chancellor, and two mathematics faculty representatives from each community college. After reviewing data, identifying specific barriers, and hearing college input, the mathematics faculty elected to engage in a comprehensive approach for change. The five

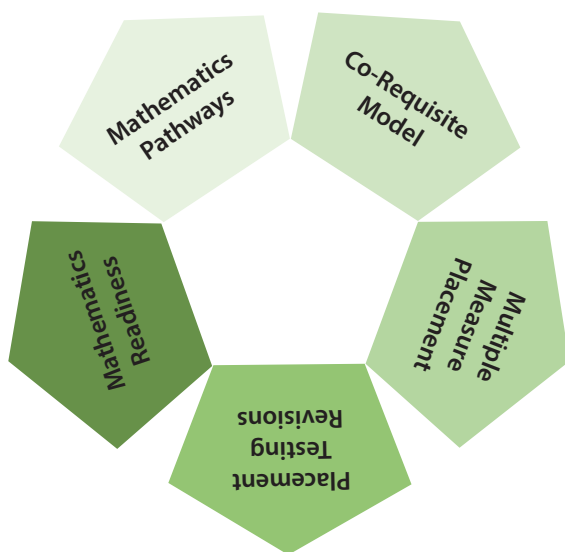
goals developed at this meeting later paved the way for multiple solutions: Mathematics Pathways, Co-requisite Models, Multiple Measure Placement, Placement Test Revisions, and Mathematics Readiness (see Figure 1).

Over the first two years of the project (2015–2017), more than 200 mathematics faculty worked at the state level, countless others worked at the college level, and over 300 external stakeholders collaborated in the creation of strategies to address the five overarching goals. The design and implementation of a multifaceted, statewide project depended on the collaborative efforts of all stakeholders, a strong focus on common goals and outcomes, clear communication methods, and the commitment to project completion and its continuous improvement.

### Organization and Processes

Creating an infrastructure that established clear and well-defined parameters about how contributors were organized and the structure in

Figure 1. VCCS Mathematics Pathways Project goals



**Mathematics Pathways:** Creation of courses down to the objective level in collaboration with universities, taught systemwide, and communicated to students as structured.

**Co-Requisite Model:** Creation of a state model providing students the opportunity to enroll in a credit mathematics course at the same time as a support class.

**Multiple Measure Placement:** Assessing students through high school GPA and course work, SAT, ACT, GED, or Virginia Placement Test to most accurately determine placement.

**Placement Testing Revisions:** Revise the current placement test to better assess those students not served by multiple measures, namely weaker or older students, by reducing the amount of time spent testing and testing only

**Mathematics Readiness:** Providing students opportunity to address remedial needs during the senior year in high school as well as work to increase communication about dual enrollment.

which work would be done was critical to project success. Tools for communication and a timeline for work completion were the foundational pieces to all the processes that followed. For the VMPP work, electronic communication tools were used, instead of face-to-face meetings, so that faculty members could be involved and continue teaching their classes as scheduled. The use of an aggressive and realistic timeline optimized the motivation and appreciation of accomplishment of those involved. An ambitious timeline required thoughtful implementation, as such a timeline causes hardships for colleges where the culture of change is slow or where size dictates the speed of change. With these agreements in place, the work of dedicated people began.

Applying a comprehensive yet simple organizing plan to Virginia's work allowed for high levels of involvement and broad-based input from all math faculty. Organizers were also mindful of the need to accomplish tasks in a timely manner and to respect the fact that not all decisions would have full stakeholder consensus. The work of the VMPP was organized using multiple workgroups supported by a project manager. The project manager served as the organizing and convening chair of all major workgroups so that connections between the groups were facilitated since so much of Virginia's work overlapped in purpose and design. Each college identified its own local project manager, called a College Contact, who served as the lead communicator between the department and the VMPP project manager. Work on each of the five major goals was spearheaded by a VCCS workgroup consisting of 23 mathematics faculty—one from each community college—and the project manager. Workgroup members held the responsibility of engaging their faculty at the college level and representing their departments throughout the process. New course design was completed through smaller work teams, which consisted of some workgroup members and additional faculty. The addition of a sixth

workgroup, Developmental Mathematics Leads, resulted in over 130 different voices involved in the initial conversation. To address areas outside of mathematics, such as necessary technical support, the application of focus groups provided opportunity for even greater collaboration.

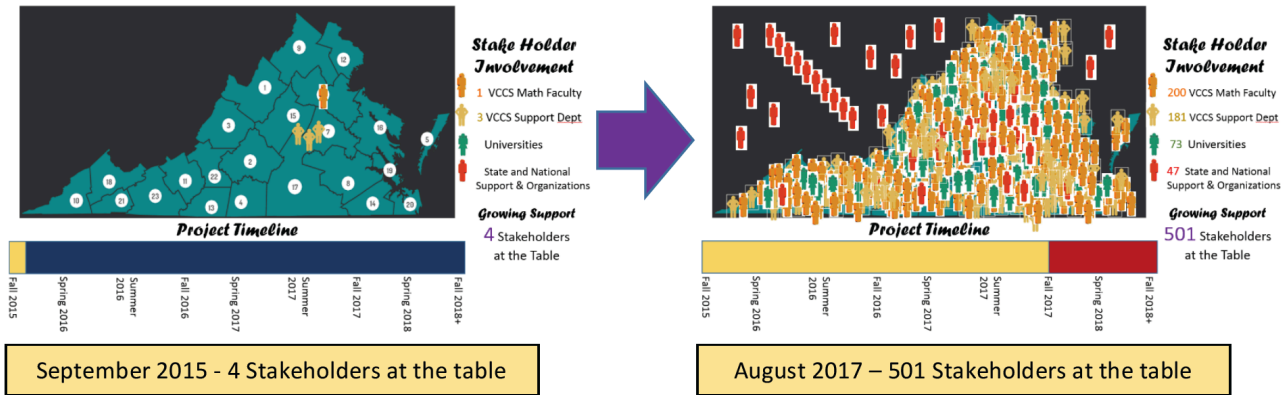
Establishing a positive atmosphere for productivity served as the final piece of an infrastructure that supported work completion. Setting parameters for engaging in that conversation resulted in all decisions being focused on what was best for the student in terms of successful completion, transferability, or entry into the workforce.

## Stakeholder Involvement

High involvement of stakeholders was key. The identification and inclusion of stakeholders proved critical to moving the project forward. Having started with four stakeholders, the project expanded collaboration beyond the VCCS and state lines to learn from state and national work. The number of stakeholders quickly grew to 501, adding great value to the project (see Figure 2).

Although initial stakeholders included just the mathematics faculty, it immediately became clear that diversifying and involving others in the project was critical to its success. As the project grew, the outreach grew. Stakeholders were expanded to include community college- and system-level administrators, support staff, and faculty from other departments, state and national organizations working on support and policy around these initiatives, Virginia's public and private university transfer offices and academic departments, and foundations and publishers that provide support materials. Key to all of this collaboration was to involve each support group immediately upon identifying that either the project would impact their jobs, or their work was a key component to the success of the project.

Figure 2. Growing support: stakeholders at the table



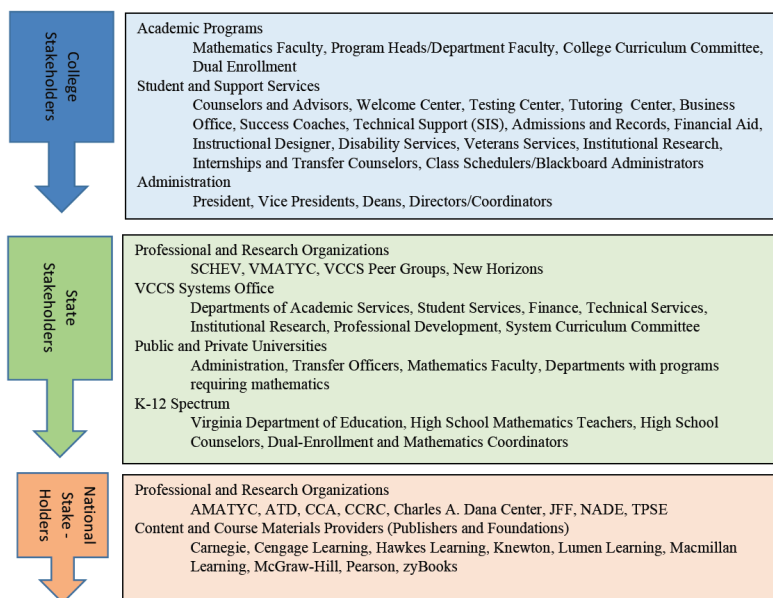
Virginia experienced the most progress when a broad spectrum of faculty engaged with supporting departments and through the development and distribution of a second draft to the college contact or point person of each project component, giving opportunity for an additional level of feedback. Stakeholders responded favorably to early and frequent communication—evidence that their input was valued. As the project work developed, regular reflection on its future implementation and its potential

impact on colleges, universities, workforce, and supporting companies helped to identify stakeholder groups that may have otherwise been overlooked (see Figure 3).

### Communication

Having a clear communication plan from the beginning and being diligent in its execution were also critical to the project’s success. With an underlying goal of keeping travel to a minimum, face-to-face meetings were reserved for the most important junctures of the project, leading to reliance on email, Google Docs, and web calls for most of the communication. Virginia’s project applied these tools to achieve widespread and strategic email communication, seeking extensive feedback at both the college and individual faculty levels, or to ignite further action at the college level. Informational web calls reached all colleges to provide updates, entertain questions, and receive feedback, while working web calls focused on developing drafts, responding to feedback, and planning for

Figure 3. Stakeholder groups with Virginia examples



implementation for various workgroups. Face-to-face meetings were key opportunities to achieve a high level of productivity and fulfill the need for all stakeholders to be in one place for collaboration and development. Virginia's two-year project utilized only five major face-to-face meetings and 14 university visits.

Sharing final documents through a public folder enabled all colleges to locate the most current version of a document and to collaborate with others. This folder was also shared with external stakeholders and interested parties.

**Figure 4. Critical points – face-to-face communication**

Fall 2015	October 2015 Kick-Off Meeting 2 Math Faculty/ College	May 2016 Math Summit 2-year & 4-year Faculty and VDOE	Summer 2016 Placement Test Rethink VPT Workgroup w/ Test Vendor	November 2016 Design to Implementation College Implementation Team	March 2017 Mathematics Pathways Institute and Publisher Showcase 6 Math Faculty/College	Fall 2017
Monthly meetings with VCCS Assistant Vice Chancellors and Coordinators overseeing state-level departments related to project.						
University visits initially involving a team of community college mathematics faculty and university mathematics faculty and evolving into expanded follow-up meetings including transfer directors and a variety of program heads.						

In all communication efforts, it was critical to be respectful of time limitations, have an established agenda shared prior to the meeting prompting college discussions, start and end on time, and monitor all written and verbal conversations to keep them focused on the goal of the specific conversation and/or the ultimate goal of the meeting.



## Success at the Hands of Many

The significant effort of over 500 stakeholders resulted in specific strategies in the five project areas (see Table 1) to improve successful student experiences in mathematics. Some components and strategies were implemented statewide, while others remained at the discretion of the college. All were aimed at increasing the number of students earning a credential and moving successfully into the workforce or university.

**Table 1. VCCS Mathematics Pathways project strategies**

<b>Mathematics Pathways</b>	<ul style="list-style-type: none"> <li>• Streamline and update the VCCS Master Mathematics Course File, creating consistency in course offerings across the VCCS.</li> <li>• Create structured mathematics pathways.</li> <li>• Align mathematics offerings, structured pathways, and degree requirements with university partners to improve transferability.</li> <li>• Reevaluate mathematics requirements for community college programs.</li> <li>• Communicate and discuss with K-12 the need for change at the community college level to better prepare students to meet the demands of universities and employers.</li> </ul>
<b>Co-requisite Model</b>	<ul style="list-style-type: none"> <li>• Identify mathematics courses and applied programs that are conducive to co-enrollment opportunities.</li> <li>• Develop a state model, related courses, parameters, guidelines, and promising practice recommendations.</li> </ul>
<b>Placement Testing</b>	<ul style="list-style-type: none"> <li>• Restructure the current Virginia Placement Test to address the changing profile of students testing, modify test length, and diversify question types.</li> </ul>
<b>Multiple Measure Placement</b>	<ul style="list-style-type: none"> <li>• Design multiple measure placement and support its implementation at all 23 colleges.</li> </ul>
<b>Mathematics Readiness</b>	<ul style="list-style-type: none"> <li>• Develop an understanding of current K-12 efforts for preparing students for mathematics readiness.</li> <li>• Develop a state model for collaboration between community college mathematics departments and high school mathematics departments for increasing the number of students entering the community college on level.</li> <li>• Develop a VCCS position on calculator use from placement to credit level courses and make recommendations on technology use based on university and workforce recommendations.</li> <li>• Develop conversation starts for dual-enrollment (DE) coordinators and faculty addressing challenges of DE programs.</li> </ul>

## We've Only Just Begun

The transition to implementation in late Fall 2016 sent colleges into a frenzy of planning. All colleges were challenged to implement all project strategies by Fall 2018 with about half of the colleges engaging in some level of early implementation in Fall 2017. The plan touched many areas of higher education from content design to pedagogy to counseling/advising to technical support. Few departments of a college were left unchanged. As Virginia headed into college-level implementation at each of the system's 23 community colleges, there was clear need for continued system-level support and future faculty engagement to maintain the vitality of this project. The types of support needed by the colleges to assure overall project success as a system include:

- Commitment to a continuous improvement model for all project strategies.
- Continued communication and collaboration between two-year and four-year institutions and among mathematics faculty.
- Implementation of assessment plans to track the impact of project components on student success.
- Development of a state-level structure for discipline-specific faculty leadership, by faculty for faculty.
- Greater attention on developing strategies and support that specifically help students of color who perform significantly lower in mathematics than white students.

## Successes

In addition to meeting the Chancellor's charge by developing and implementing the strategies to increase student success, this project impacted Virginia more broadly than expected.

Through the VMPP and the hard work of all its mathematics faculty and other stakeholders, Virginia has...

- Developed the VCCS Mathematics Pathways for Transfer that limits course choices while still meeting the requirements of students' programs and provides mathematics content directly related to future academic and career plans.
- Decluttered the VCCS Master Course File by replacing 61 loosely defined courses with 26 well-defined courses that were developed through collaboration between two- and four-year institutions.
- Improved the communication between Virginia Department of Education (VDOE) K-12 and postsecondary institutions, resulting in models developed for increasing mathematics readiness and increasing the dual-enrollment conversation as well as purposeful conversation around the use of technology in the mathematics classroom.
- Engaged in the development of the VCCS Multiple Measures for Placement and a renewed placement testing structure.
- Developed, piloted, and implemented a co-requisite model for all gateway courses, setting parameters and guidelines for colleges offering this option to students.
- Brought the national mathematics and completion conversations to Virginia for the first time by hosting a math summit that included mathematics faculty and representatives from Virginia Department of Education, Virginia Community College System, and Virginia public and private universities. This summit was co-sponsored by the State Council of Higher Education in Virginia (SCHEV) and the VCCS and highlighted the Charles A. Dana Center's Uri Treisman as the keynote speaker.



- Opened internal and external doors for purposeful conversation among K–16 faculty and institutions.
- Included the system's Developmental Mathematics College Leads in the conversation with the result of increased strategies available to colleges to best meet developmental student needs such as module-based instruction, core bundles, co-requisite courses, career and technical embedded courses, and high school mathematics readiness options.
- Experienced a faculty-grown, system-supported initiative.

## Challenges and Lessons Learned

The project and its future are not without challenges and lessons learned. Most of the challenges centered on communication and in working with multiple institutions. Listed below are four items that may benefit others seeking to embark on statewide initiatives.

- **Beware of silos of communication:** The communication with and within each organization touched by this project proved to be isolated and not broadly shared. The assumption that one conversation would lead to many conversations was a false one. Requests for follow-up from individuals or institutions may spur broader conversations within the organizations.
- **Build consensus:** The initial success of this project depended on the consensus of many people from many different institutions. Perseverance and outreach by the project manager and other project champions often resulted in reaching a common ground.
- **Navigate systems:** When working with many organizations and institutions, navigating each system was time-consuming and challenging. Few organizations shared similarities in structure, persons of contact, or level of involvement. Patience and time conquered the challenge.
- **The ostrich effect:** Communication needed to be early and often, but messages and decisions were not always heard or received, causing implementation and change to be challenging. When stakeholders entered late into the conversation—most often after all decisions were made, implementation plans were in place, and the impact on the institution was established—it was important to acknowledge their concerns, remind them of the processes followed and the consensus reached, and patiently support them. Continued faith in the process was necessary.

The Virginia Mathematics Pathways Project is not the final step, but rather the first step in the right direction for supporting students as they challenge themselves to reach their goals. The project strategies, when coupled with initiatives such as Guided Pathways, Success Coaching, and advising restructuring, offer students better options for mathematics course placement and selection and can help maximize college completion. When the Virginia Community College System achieves its completion goal in 2021, it will embrace a new strategic plan. Students' success will be at the heart of its charge and its faculty will be ready to be a driving force to find a solution. Change driven by grassroots efforts is growing in Virginia. Other states have joined the national mathematics pathways movement. Virginia's grassroots efforts serve as a model to states aspiring to join the movement and drive change that is faculty led, administratively supported, and policy enabled.

## References

Complete College America. (2017). *College Completion data: Time is the enemy of college completion*. Retrieved from <http://completecollege.org/college-completion-data/>

State Council of Higher Education for Virginia (SCHEV). (2017, March). *VCCS data: Mathematics performance metrics, FY 2017 VCCS outcomes-based funding measures. Sub-cohort survival map and details*. Retrieved from [http://research.schev.edu/gradrates/subcohort\\_details.asp](http://research.schev.edu/gradrates/subcohort_details.asp)

## Resources

VCCS Mathematics Pathways Project: Collaborative Site. In addition to project documents, a research/resource folder contains many articles and data sources that provided a foundation for our conversations and influenced many of our decisions. [www.tinyurl.com/VCCSMathPathways/](http://www.tinyurl.com/VCCSMathPathways/)

## About the author



**Patricia Parker** served the Virginia Community College System (VCCS) as the VCCS Mathematics Pathways Project Manager and now serves as the Project Director for Transfer Virginia, a comprehensive transfer initiative for all of higher education in Virginia. Over the last 28 years, she served several institutions in the Commonwealth as a mathematics teacher, professor, and/or department chair. Her work with Virginia's 2012 Redesign of Developmental Mathematics, the Mathematics Pathways Project, and the current Transfer Virginia initiative have proven to be the most exhilarating and challenging aspects of her 28-year teaching experience. Her passion for engaging others in positive change has served her well in helping the Commonwealth of Virginia reach its ambitious goals.