Project Narrative (Early-Phase)

Introduction

To help math teachers in high-need middle schools provide opportunities for all students, including underserved students, to be successful in Science, Technology, Engineering, and Math (STEM), American Institutes for Research® (AIR®) and Modern Classrooms Project (MCP) propose a project that exemplifies **Absolute Priorities 1 and 3** as well as **Competitive Preference Priorities 1 and 2 (CPP1 and CPP2).** The *Individualized Math Instruction with The Modern Classrooms Project* focuses on the instructional model and associated teacher supports developed by MCP. The field-initiated instructional model was developed by two math teachers in urban schools in 2016 out of frustration with existing models that failed to (a) create in-classroom time to provide individualized instruction and support, particularly for low-performing students, and (b) engage all students in learning. To better meet their students' needs, the teachers developed a student-centered instructional model that can be used with any curriculum to provide personalized, individually paced, and mastery-based instruction delivered through coordinated physical and digital learning environments. Teachers develop and use video recordings of instruction, individualized student learning paths, student progress trackers, mastery-based assessments, and technology to meet students' learning needs and promote engagement. The program also provides supports to help teachers implement the instructional model. The Modern Classrooms (MC) instructional model was recognized for its innovation in 2018 with District of Columbia Public Schools' Excellence in Classroom Innovation Award, and the two teachers who originally developed the model founded MCP to spread its use. MCP trained and supported eight teachers in 2018 and close to 3,000 teachers by the end of 2021.

In partnership with districts that serve high-need students, this project will refine, test, and understand the "take up" and sustainability of the MC instructional model and associated teacher supports (hereafter, the MCP Program) in Grades 6–8 math classrooms in high-need schools. The project will include multiple cohorts of Grades 6–8 math teachers, as shown in Exhibit 1. A pilot cohort will provide the basis for iterative improvement of the MCP Program, using implementation data collected by AIR and MCP. The AIR evaluation team will then conduct a teacher-level randomized controlled trial (RCT) to generate rigorous evidence on the impact of the 1-year MCP Program with two cohorts of teachers. To understand implementation under "typical" conditions, AIR will collect program implementation data in the follow-up year (i.e., the year after the program year) from treatment teachers who continue to implement the model and control teachers who receive delayed treatment after the end of the program year.

Exhibit 1. Number of Implementing Teachers by Year and Cohort

Cohort	2023 24	2024 25	2025 26	2026 27
Pilot cohort	8 teachers			
Impact Cohort 1		30 treatment teachers (Program Year)	Up to 30 treatment teachers and up to 30 control teachers with delayed treatment (Follow-Up Year)	
Impact Cohort 2			30 treatment teachers (Program Year)	Up to 30 treatment teachers and up to 30 control teachers with delayed treatment (Follow-Up Year)

A. Significance

A1. A Project to Address Disparities in Math Learning and Engagement

Before the COVID-19 pandemic, achievement gaps in math were already a major challenge for schools. The United States had made modest progress in reducing math achievement gaps for elementary-age students but not for students in middle and high schools (Irwin et al., 2021). The pandemic exacerbated existing disparities in math achievement, lowering students' math performance levels and widening the equity gaps (Dorn et al., 2021a, 2021b; Kuhfeld et al., 2022). Learning loss has been most acute for underserved students, including students in high-poverty schools and students who were low-achieving before the pandemic. These results are particularly problematic, given the importance of math for high school graduation, college enrollment, and success in STEM occupations (Mamedova et al., 2021).

In addition, the level of student engagement dropped precipitously. The pandemic has threatened the mental health and social well-being of this country's children and youth (Meherali et al., 2021), and absenteeism has increased significantly for secondary students (Dorn et al., 2021b). More than ever, secondary students need to feel connected to others and that their individual learning needs are being met so that they can engage with classroom activities.

The most powerful lever available to improve students' math engagement and achievement is the quality of the teaching that students receive every day. Longitudinal research consistently shows the importance of teachers in improving student outcomes—achievement outcomes as well as social and emotional competencies and later-life outcomes (Chamberlain, 2013; Chetty et al., 2014; Gershenson, 2016; Kraft, 2019; Rivkin et al., 2005). Meanwhile, teachers face greater variability in student engagement and learning needs than they did prior to the pandemic (Dorn et al., 2021b). Secondary teachers in particular require new and innovative approaches to meet student needs in this context, especially given that they teach on average 75–100 students, which includes multiple sections of 23–25 students (Taie & Goldring, 2020).

This project focuses on an innovation that addresses the challenges middle school teachers face in providing students with equitable access to educational opportunities in math, while addressing individual learning needs in ways that exemplify **CPP1**. Specifically, the innovation includes a student-centered instructional model that leverages technology to provide personalized and individually paced learning activities. Once students demonstrate mastery of a topic, they move to the next topic. As teachers use the instructional model, they examine differences in student learning and engagement and provide customized support to address those differences.

In addition, with its focus on evidenced-based instructional approaches for underserved students and implementation supports for the teachers of those students, the project also addresses the impact of COVID-19 in a way that exemplifies **CPP2**. The instructional model and teacher supports include features that research suggests hold promise for improving student learning and engagement. By assessing student needs and offering personalized learning activities responsive to those needs, teachers address differences in prior knowledge in the same classroom, thus reducing the extent to which students are tracked or placed in remedial courses. Moreover, students, including those who were previously disengaged, are more likely to engage with activities that are tailored to their learning needs in classrooms where they feel supported.

A2. A Promising Approach to Address Variability in Students' Math Learning Needs

The components of the MCP Program draw on evidence-based strategies for instruction and teacher support as articulated in the conceptual model (see Section B1 and Appendix G). The MC instructional model includes two promising strategies: *personalized learning activities* and *individually paced learning based on mastery assessment*. To provide a structure to implement these student-centered strategies, the model uses coordinated digital and physical learning environments. The MCP teacher supports build on evidence-based features of effective professional development in which teachers are trained in the summer and receive individualized feedback on implementation throughout the school year.

Personalized Learning Activities. The first promising strategy leveraged by the MC instructional model is personalized learning activities in which instruction is tailored to student needs, individual learning paths are defined, and progress on those paths is clearly tracked. A recent quasi-experimental study found that personalized learning had significant, positive effects on math achievement (Pane et al., 2017). Further, several meta-analyses of quasi-experimental and experimental studies of interventions have found positive effects of personalized learning in the form of tutoring on student achievement (Dietrichson et al., 2017; Nickow et al., 2020; Pelligrini et al., 2021). One of those meta-analyses found that, in addition to tutoring in which instruction was tailored to student learning needs, programs that included progress monitoring and feedback had positive effects on student achievement (Dietrichson et al., 2017).

In the MC instructional model, activities are tailored to students' learning needs, with tools for tracking progress. For each unit in the curriculum, the teacher identifies and sequences the key lessons for that unit and classifies the lessons into three buckets—"must do," "should do," and "aspire to do." The teacher also creates a student tracker for each unit and defines the path through the lessons. Each lesson includes a teacher-created video, along with guided notes for students that introduce the lesson topic as well as associated activities. During class, students review the videos on their learning path and receive personalized instruction, or tutoring, from the teacher as they work on associated lesson activities. The teacher monitors individual progress through a class-level pacing tracker that includes a summary row for each student in the class (see Exhibit J.1.1 in Appendix J). Students are encouraged to rewatch the videos until they understand the material, request support from the teacher when needed, and track their progress.

Individually Paced Learning Based on Mastery Assessment. The second promising strategy is individually paced learning based on mastery assessment. Students move to the next topic only when they have demonstrated mastery of the previous topic. Researchers have been examining the benefits of mastery-based learning for several decades, and an early meta-analysis of experimental studies of the approach applied to coursework from upper elementary grades through college found positive impacts on students' course performance and attitudes toward course content (Kulik et al., 1990). More recently, mastery-based assessment has become a cornerstone of the movement toward competency-based education (Brodersen et al., 2017), which has been shown to have positive effects on student learning, particularly for students whose skills are below grade level. The study conducted by Brodersen and Randel (2017), for example, found that students with below-grade-level math performance in competency-based education programs progressed faster than they would have in a traditional education system.

As students taught by the MC instructional model work through their personalized tracker, they move at their own pace, continuing to spend time on a topic until they achieve proficiency or competency; students cannot get a low grade and move on. To assess proficiency, mastery checks are woven into the learning process. Every lesson is followed by a short assessment to ensure mastery. Students who lack mastery can revisit the lesson materials, collaborate with peers, or work with the teacher before another attempt.

Coordinated Digital and Physical Learning Environments. To facilitate implementation of the strategies for providing personalized and individually paced learning opportunities, teachers use their schools' learning management system (LMS) to create a digital classroom that integrates with the physical classroom. The coordination between work in the LMS and in-person class activities provides a structure for teachers to get to know their students, customize instruction, provide individualized support for those students, and develop stronger teacher-student relationships than can be achieved in a traditional classroom. Researchers have argued that positive relationships and support from teachers can foster motivation (Osher et al., 2020) and that increased motivation may lead to stronger engagement in the classroom. Indeed, a mixed methods study of secondary student engagement in math and science found that teacher support was positively associated with student engagement (Fredericks et al., 2018).

In the MC instructional model, students access the lesson videos and guided questions, lesson activities, and mastery checks via the LMS. The physical classroom is used to coordinate work in the LMS with opportunities for in-person individualized or small-group support. For example, teachers may organize their classroom into stations, including space for (a) asking questions, (b) working on mastery checks, (c) participating in small-group instruction, and (d) using the LMS (unless students have laptops) for accessing curated online content. As students experience instruction tailored to their learning needs and have opportunities for individualized support from their teacher, they may feel more success and develop stronger relationships with their teacher. As a result, students may be more motivated to learn, which leads to stronger engagement.

Teacher Supports. To support implementation, MCP offers initial summer training and ongoing support to teachers during the school year, which rigorous research indicates can have positive effects on teachers' instruction (Garrett et al., 2019). The supports are tailored to individual teachers' learning and implementation, providing a form of coaching for teachers. Meta-analyses of RCTs have also found positive impacts of coaching programs on instruction (Garrett et al., 2019; Kraft et al., 2018) and student achievement (Kraft et al., 2018).

Initial training includes a 4-week, mostly virtual summer institute, which is primarily self-paced and asynchronous. Each teacher learns about the program and submits portfolio exercises to an MCP-trained mentor, who has prior experience as an MCP teacher. The mentor provides feedback and is available for consultation during the training. The portfolio exercises help teachers develop the tools and lessons they will need to implement the MC instructional model in the fall. Then, during the school year, MCP offers (a) each participating teacher a minimum of three individualized mentor consultations, in which teachers and mentors discuss an artifact of implementation (e.g., a lesson or updated pacing tracker) and ways to improve implementation; (b) each participating district six discussion sessions with MCP staff, in which teachers consider ways to address challenges faced; and (c) each participating school two site visits in which MCP staff observe and debrief teachers, all with an eye toward improving implementation. In addition, MCP offers on-demand online resources, including exemplar units, for teachers as well as initial training and ongoing support for mentors. (See Appendices J.1.2 for more information on teacher training and J.1.3 for the rubric MCP uses to guide implementation conversations.)

A3. A Project That Provides an Alternative to Existing Strategies

The MC instructional model represents an alternative to traditional instructional approaches in secondary math, which emphasizes whole-class instruction (Malzahn, 2020), with students completing the same learning activities and moving through the curriculum at the same pace. Used with a teacher's existing curriculum, the MC instructional model provides a concrete way to deliver personalized instruction and allows students to move to the next topic only when they are ready through the use of coordinated digital and physical learning environments. By tailoring instruction to student learning needs, the MC instructional model helps teachers build relationships with students and holds promise for improving student learning and engagement.

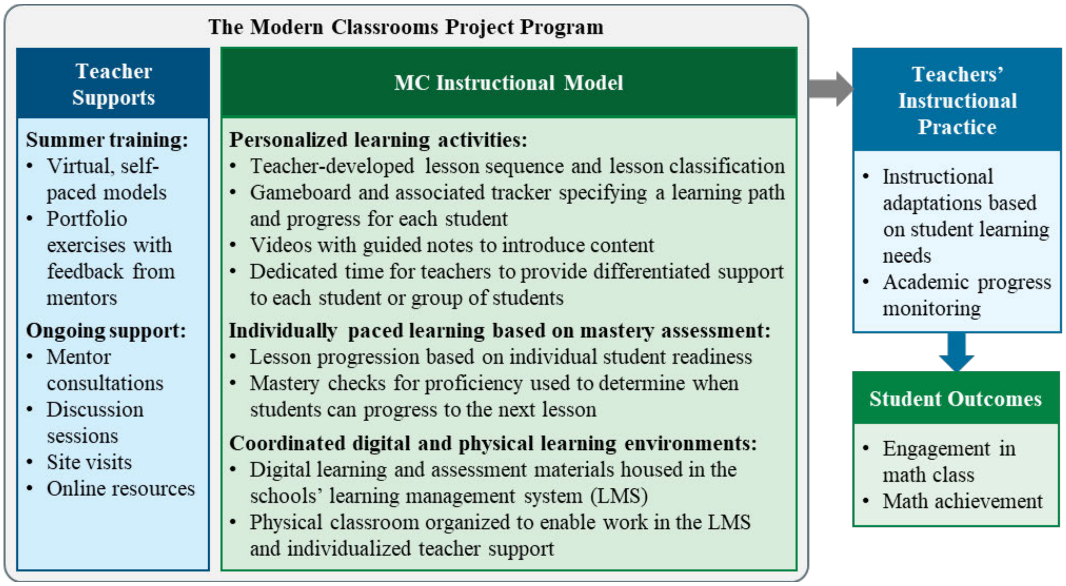
Although the model is an innovative, field-based approach to addressing a current need (see Section A1), more work is needed to understand how the model is used in secondary classrooms, the supports needed for strong implementation, and the model's impact on student outcomes, particularly those of underserved students. With its focus on middle school math classrooms in high-need schools, which we define as those eligible for a Title I schoolwide program, the project will contribute to knowledge about and rigorous evidence on this innovative, promising instructional model and associated teacher supports.

B. Quality of the Project Design

B1. Clearly Articulated Conceptual Framework Underlying the Proposed Project

The proposed research is supported by a clearly articulated conceptual framework, as depicted in Exhibit 2 and Appendix G and elaborated in Section A2.

Exhibit 2. Conceptual Framework Underlying the MCP Program



When implemented well, the MCP Program, which includes the MC instructional model and teacher supports, is hypothesized to improve student outcomes through shifts in the delivery of math instruction that are directly related to the promising features of the MC instructional model. Instructional delivery shifts include adapting instructional activities to address differences in student learning and engagement and using data to monitor academic progress. Through these shifts, the model is hypothesized to have an impact on student engagement and math achievement. The project will focus on testing the conceptual framework underlying the project within the context of Grades 6–8 math courses.

B2. Clearly Specified and Measurable Goals, Objectives, and Outcomes

The project's primary goal is to refine and test the MCP Program; its secondary goal is to gain an understanding of program "take-up" and sustainability under typical conditions. To meet these goals, we define three objectives and a set of strategies and outcomes associated with each objective that are clearly specified and measurable, as shown in Exhibit 3.

Exhibit 3. Strategies, Outcomes, and Measures for Key Project Objectives

Strategies	Outcomes	Measures
Objective 1. Implement, monitor, and refine the MCP Program using the pilot cohort (summer 2023 to spring 2024)		
Strategy 1.1. Recruit 8 teachers within partner districts to participate.	Eligible teachers agree to participate in the project for 1 year.	Measure 1.1. Districts, principals, and teachers sign project memo of understanding (MOU).
Strategy 1.2. Implement the MCP teacher supports.	MCP provides summer training and ongoing supports (e.g., mentor consultations, site visits, and implementer discussion) to teachers.	Measure 1.2. MCP keeps administrative records documenting coverage of planned activities and teacher participation in those activities.
Strategy 1.3. Implement the MC instructional model.	Teachers implement the MC instructional model in at least half of their units in their math classes.	Measure 1.3. Teachers complete online logs documenting how often they used the MC instructional model in class.
Strategy 1.4. Collect implementation data.	AIR collects data on the extent to which all program activities were implemented as planned; AIR also collects data on teachers' perspectives of the model (e.g., feasibility, challenges) and students' perspectives of their engagement in class.	Measure 1.4. AIR collects MCP administrative records and teacher logs; AIR conducts teacher interviews and student focus groups with a sample of teachers and students.
Strategy 1.5. Analyze implementation and share findings.	AIR analyzes implementation data; summarized data are shared quarterly with MCP.	Measure 1.5. AIR uses all implementation data to develop quarterly implementation briefs for MCP.
Strategy 1.6. Refine the teacher supports and the MC instructional model.	MCP refines the design of its teacher supports and the MC instructional model based on implementation data from the pilot cohort.	Measure 1.6. Biannual memo documents design changes that have been made in response to implementation analyses.
Objective 2. Examine implementation and assess the impact of the MCP Program using Impact Cohorts 1 and 2 (spring 2024 to fall 2027)		
Strategy 2.1. Recruit 120 teachers who are willing to be randomly assigned for the impact evaluation.	Eligible teachers agree to participate in the project for 1 year.	Measure 2.1. Districts, principals, and teachers sign project memo of understanding (MOU).
Strategy 2.2. Randomly assign teachers to treatment and control conditions in each school (60 teachers per group).	AIR randomly assigns teachers to treatment and control conditions; AIR checks for baseline equivalence.	Measure 2.2. AIR documents the number of teachers in each condition.
Strategy 2.3. Implement the MCP teacher supports for treatment teachers.	MCP provides summer training and ongoing supports (e.g., mentor consultations, site visits, and implementer discussion) to treatment teachers.	Measure 2.3. MCP keeps administrative records documenting coverage of planned activities and treatment teacher participation in those activities.
Strategy 2.4. Treatment teachers implement the MC instructional model.	Treatment teachers implement the MC instructional model in at least half of their units in their math classes.	Measure 2.4. Treatment teachers complete online logs documenting how often they used the MC instructional model in class.

Strategies	Outcomes	Measures
Strategy 2.5. Collect implementation data.	AIR collects data on the extent to which all program activities were implemented as planned as well as teachers' and students' perceptions of the impact of the MC instructional model on student engagement in class.	Measure 2.5. AIR collects MCP administrative records as well as teacher survey, and log data; AIR conducts student focus groups with a sample of students of treatment teachers.
Strategy 2.6. Analyze implementation data and share findings.	AIR analyzes implementation data; summarized data are shared quarterly with MCP.	Measure 2.6. AIR uses all implementation data to develop quarterly implementation briefs for MCP.
Strategy 2.7. Assess the impact of the MCP Program on teacher's instruction and student achievement	AIR conducts impact analyses and produces impact findings that meet What Works Clearinghouse (WWC) standards with reservations.	Measure 2.7. AIR documents impact analyses and findings in an impact findings memo.
Strategy 2.8. Disseminate findings.	AIR and MCP make the findings from the impact study publicly available.	Measure 2.8. Number of presentations and materials developed.
Objective 3. Provide feedback to MCP on program take-up and sustainability under typical conditions based on data collected in the follow-up year from treatment teachers who continue for a second year and control teachers receiving delayed treatment in Impact Cohorts 1 and 2 (summer 2025 to fall 2027)		
Strategy 3.1. Offer delayed treatment to the control teachers in the follow-up year and collect data on teacher participation.	MCP makes the summer training and ongoing supports (e.g., mentor consultations, site visits, and implementer discussion) available to control teachers in the follow-up year.	Measure 3.1. MCP keeps administrative records documenting coverage of planned activities and teacher participation in those activities.
Strategy 3.2. Collect implementation data from control teachers receiving delayed treatment and treatment teachers who continue for a second year.	AIR collects data on the extent to which teachers implement the MC instructional model in the follow-up year, their perspectives of the model, and their students' engagement in class.	Measure 3.2. AIR collects MCP administrative records and teacher logs; AIR conducts teacher interviews and student focus groups with a sample of teachers and students.
Strategy 3.3. Analyze implementation data to understand "take-up" of the program and sustainability under typical conditions; share findings.	AIR analyzes implementation data and shares the findings with MCP.	Measure 3.3. AIR drafts a memo summarizing findings regarding program "take-up" and sustainability.

Program Refinement and Implementation Monitoring (Objectives 1, 2, and 3). The project is designed to monitor program implementation and ensure continuous improvement through its (a) routines for generating and using feedback and (b) sequenced cohort structure. During the execution of each strategy listed in Exhibit 3, the project team will routinely identify lessons learned and either make immediate improvements or plan improvements for the next cohort.

Assess the Impact of the MCP Program (Objective 2). The project will provide rigorous evidence about the impact of the MCP Program on instruction and student achievement. Based on an RCT with a large sample from multiple study sites, the evaluation will generate evidence on the impact of the MCP Program that has not yet been tested with a rigorous study.

Understand Program "Take-Up" and Sustainability (Objective 3). By tracking implementation in the follow-up year, the project will provide information about take-up and sustainability of the program. Analyses of these data will provide information on the extent to which new teachers take up the program and current teachers sustain implementation under typical conditions, without the support of a study team doing an impact evaluation. Findings will inform future program refinements and will provide insight into potential scaling supports.

B3. Appropriate Project Design for Addressing the Needs of the Target Population

With its focus on refining, testing, and understanding take-up and sustainability of a program that includes a field-initiated instructional model and associated teacher supports for addressing variability in student learning needs and engagement, this project is well designed for meeting the needs of its target population: underserved Grades 6–8 math students in high-need schools and their teachers. As explained in Section A1, differences in math achievement and engagement within the target student group persist and have been exacerbated by the COVID-19 pandemic. These students' teachers typically teach 75–100 students and need strategies to address differences in student learning needs and engagement within the same classroom.

The MCP Program includes (a) an evidence-based, student-centered instructional model that leverages technology and (b) evidence-based teacher supports designed to provide equitable access to education for students in high-need schools. Research indicates that students in high-need schools have less access to effective teaching than do their counterparts in low-poverty schools (see, for example, Goldhaber et al., 2015, 2019; Isenberg et al., 2013). Moreover, difference in access to high-quality teaching contributes to differences in achievement (Isenberg et al., 2013). These results suggest that instruction in high-poverty schools is not adequately addressing students' learning needs. Teachers in high-need schools need strategies to address student needs, and they need support to implement those strategies.

There is evidence that the features of personalized learning included in the MC instructional model—particularly providing individualized instruction, assessing and addressing students' unique learning needs, and monitoring progress—may be effective at improving learning for students in high-need schools. A recent meta-analysis of RCT studies of academic interventions for elementary and middle schools with low socioeconomic status found that interventions having a tutoring and/or progress monitoring with feedback component had positive effects on achievement (Dietrichson et al., 2017). In addition, a recent quasi-experimental study of a personalized learning approach having these features found that students in the lowest quintiles of math performance outperformed students in the lowest quintiles in the comparison group by 60% (Pane et al., 2017).

Research also indicates that the MCP Program's focus on individualized pacing based on mastery assessment is well suited for math students in high-need schools, particularly those students who are performing below grade level. In a study of mastery-based assessment, students whose performance was below grade level met their performance objectives in less time than it would take in a traditional system (Brodersen & Randel, 2017). In fact, a greater percentage of students in the lower quartiles met academic standards in math than in reading (Brodersen & Randel, 2017). These results suggest that the approach may be more effective in math, a subject for which mastery is needed for success in future coursework and the development of a new skill often requires mastery of a prerequisite skill.

Finally, research on student engagement suggests that the relationships that may form through personalized learning activities are effective for underserved, disengaged students in high-need schools. When compared with teachers in low-poverty schools, teachers in high-poverty schools more frequently report that "student apathy" poses a barrier to student learning (Garcia & Weiss, 2019). As reported in Section A2, positive relationships can foster motivation, which may result in stronger student engagement. A study of underserved students found that students who were in more supportive math classes felt more motivated to learn (Fredericks et al., 2018).

A recent evaluation of the MCP Program in secondary schools, including schools in a high-need district, suggests that features of personalized, individually paced instruction and opportunities for relationship building discussed previously are apparent in MCP classrooms. Teachers who participated in the MCP Program reported that they "understand what each of my students has and has not mastered," are "able to work closely with each of my students during class," and "use data to provide effective targeted supports" at greater rates than teachers from the same schools who did not participate in the program. Furthermore, students taught by MCP Program participants reported that their teacher "knows my strengths and weaknesses," "cares about me as an individual," and "gives me personal support and encouragement" more frequently than did students taught by teachers who did not participate in the program. (Morrison et al., 2021).

C. Quality of Project Personnel

We have assembled a team from AIR and MCP with expertise in project and task leadership, math teaching and learning, teacher professional development, program implementation and improvement, and research methods (see Appendix B for résumés). Consistent with AIR's commitment to advancing standards for diversity, equity, and inclusion within our project staff and activities, our team represents a diverse group of individuals with experience working with communities like those that are the focus of this project.

[redacted] will be the ***principal investigator (PI)***, providing oversight and intellectual leadership on all project activities. [redacted] brings extensive expertise in math teaching and learning, instructional design, continuous improvement methods, and research. She is currently the PI on a project to conduct simultaneous efficacy studies in Title I schools of interventions funded through the Bill and Melinda Gates Foundation's *Balance the Equation (BTE) Grand Challenge* to improve math outcomes for students who are Black, Latinx, affected by poverty, and designated English learners. [redacted] is the co-PI for Institute of Education Sciences (IES)–funded projects that involve development and rigorous testing of two math-focused teacher professional development programs in Title I schools. [redacted] also directs two networked improvement communities in which high school math teachers iteratively develop and refine instructional routines aimed at improving math outcomes for low-performing students.

[redacted] ***(AIR)*** will be the ***project director***, managing the project, including all aspects of the work needed to address the objectives outlined in Exhibit 3. [redacted] has more than 10 years of experience in the execution of rigorous econometric and behavioral science techniques applied to policy questions in the education field. He regularly conducts research using experimental and quasi-experimental designs. He currently serves as a study director for one of the *BTE* efficacy studies and the project director on a national evaluation of math and reading performance of students taught by Teach For America AmeriCorps members. He previously served as the quantitative lead on the Ongoing Assessment Project, a math formative assessment program in Philadelphia area schools.

[redacted] will be the ***partnerships lead***, working closely with MCP to recruit participants for the project. [redacted] brings 10 years of experience building and strengthening partnerships with districts and provider organizations in similar projects. She is currently the partnerships lead, responsible for recruitment, for an impact evaluation of a professional learning program funded through the Education Innovation and Research program.

[redacted] will serve as the ***continuous program improvement lead*** and will lead the effort to refine the MC instructional model and teacher supports. [redacted] brings expertise in program evaluation, data management, and continuous improvement. As the director of research and continuous improvement at MCP, [redacted] oversees a portfolio of research and evaluation projects and works with MCP leaders to collect data that are used to continuously improve MCP's services and products.

[redacted] will serve as the ***school transformation lead***. She will oversee the delivery of MCP teacher supports. [redacted] has more than 10 years of experience in school improvement and developing partnerships with practitioners. She is currently the director of partnerships at MCP, leading the effort to build relationships with districts and schools while overseeing implementation of the MCP teacher supports. Previously, [redacted] worked in schools coaching school leaders and their teams on improving student outcomes. Before that, she spent 10 years as a teacher and school leader with Knowledge is Power Program (KIPP) schools.

[redacted] will be the ***evaluation lead***. She will oversee the evaluation of the MCP Program, managing the randomization of teachers and leading all aspects of data collection and analysis. [redacted] brings expertise in large-scale program evaluations, study design, and statistical methodology. She currently serves as the deputy project director for an evaluation of a teacher professional development program funded by the Supporting Effective Educator Development grant program and is the evaluation lead for an efficacy evaluation of a student learning program in Texas. She has previously served as the evaluation lead for three different studies of programs—including those that leverage use of technology—designed to improve student learning, engagement, and socioeconomic well-being.

[redacted]*)* will be the ***fidelity and qualitative lead.*** She will oversee implementation data collection and analyses. [redacted] has expertise in math teaching and learning, in continuous improvement methods, and in measuring program implementation. [redacted] currently works with high school teachers to use improvement science to improve their math instruction for low-performing students as part of two different networked improvement communities. Previously, [redacted] developed and oversaw implementation procedures for monitoring and collecting implementation data in the *BTE* project.

[redacted] will be a ***senior advisor*.** She will provide guidance and expertise on all aspects of the evaluation of the MCP Program. She has applied her research design and advanced quantitative methods expertise to such projects for almost 20 years.

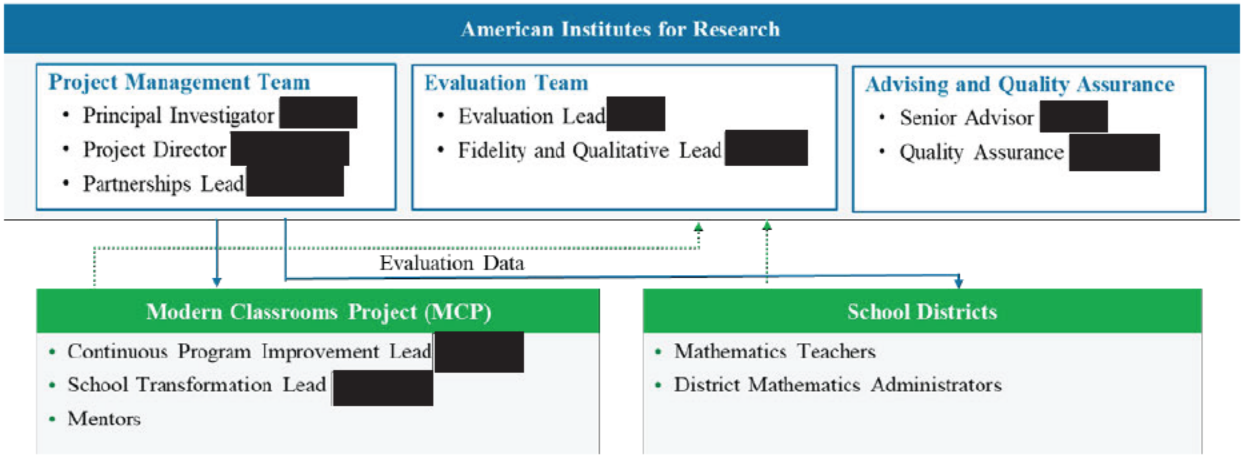
[redacted] will be a ***quality assurance reviewer***. He will provide careful review of all products, including memos and reports. [redacted] brings 15 years of experience leading projects that refine and test teacher professional development programs in urban settings.

D. Quality of the Management Plan

D1. A Management Plan With Clearly Defined Responsibilities, Timelines, and Milestones

Our management plan ensures that the objectives will be achieved on time and within budget. It also draws on the expertise of our project personnel, who are organized into teams (Exhibit 4). The plan assigns responsibility for each project objective and strategy (see Section B2) to a lead staff member who has a track record of success (see Section C for staff qualifications). The plan also specifies the timeline and milestones for each strategy. The lead for each strategy will engage other partners and project personnel as needed to accomplish the strategy. The project timeline chart presented in Appendix J.2 indicates the lead staff and milestones for each strategy.

Exhibit 4. Organizational Chart



AIR is the lead organization for the project, responsible to the U.S. Department of Education for grant performance. AIR's role is to (a) manage the project, including providing oversight to MCP and the school district partners, ensuring coordination to achieve the project objectives, and recruiting teachers from school district partners; (b) conduct the independent evaluation; and (c) provide quality assurance. MCP will support recruitment, oversee implementation, provide the teacher supports, and use findings from implementation analyses to refine the program. MCP staff will track teacher progress in the summer training; hire, train, and monitor the work of the mentors; lead the implementation discussions; and conduct the site visits.

Consistent with Office of Elementary and Secondary Education (OESE) guidance for independent evaluation (Abt Associates, 2020), the AIR evaluation team will be separate from the AIR project management team and will have no role in the development or implementation of the MCP supports or MC instructional model except evaluation feedback. This structure ensures the independence of key evaluation activities. In addition, AIR trains staff to report concerns about independence and tracks labor charges by task to ensure the division of labor between the project management tasks and the evaluation tasks.

AIR is uniquely qualified for this role. Using its extensive management infrastructure, AIR has a distinguished track record of projects focused on math teacher professional learning, instructional change, and student-facing math programs, including those that leverage technology. In each project shown in Appendix J.3, AIR coordinated across subcontracted organizations and multiple districts; recruited participating districts, schools, and teachers; and conducted an independent evaluation to assess impact. Across this work, AIR has developed tools and routines to provide independent, actionable feedback to our partners.

MCP also is uniquely qualified for their role in supporting program implementation and improvement. They have been implementing the MCP Program since 2016 and are well positioned to draw on the implementation data to make program refinements. They currently have robust continuous improvement processes for collecting participant feedback and making program refinements based on that feedback in place. These existing processes will complement AIR's independent evaluation to support strong implementation and program improvement.

With support from AIR and MCP, teachers will implement the MC instructional model and participate in all planned data collections. District administrators will meet with MCP and AIR to schedule recruitment meetings, plan for implementation, discuss project progress, and address challenges. To achieve the project's intended scale, AIR has already recruited 3 districts with 38 high-need middle schools in total (see Appendix J.4) and will recruit additional or replacement districts as needed during the project period.

E. Quality of the Project Evaluation

E1. Methods to Generate Evidence That Meets WWC Standards With Reservations

AIR will conduct an independent evaluation to answer four research questions (RQs) about the impact of the MCP Program: RQ1: What is the impact of the MCP Program on teachers' instructional practice? RQ2: What is the impact of the MCP Program on students' math achievement? RQ3: To what extent is the impact of the MCP Program on students' math achievement moderated by student and teacher characteristics? RQ4: To what extent is the impact of the MCP Program on students' math achievement mediated by teachers' instructional practice? To help interpret impact findings and inform continuous improvement of the MCP Program, we also plan to address three RQs about the implementation of the program based on data from all three cohorts: RQ5: What are teachers' and students' perceptions of the MCP program? RQ6: To what extent is the MCP Program implemented with fidelity? RQ7: What factors hinder or facilitate the implementation of the MCP Program?

Evaluation Design. The preceding RQs will be addressed with data collected from three successive cohorts of Grades 6–8 math teachers—a pilot cohort and two impact cohorts—as shown in Exhibit 1. The two impact cohorts, which will be the basis for a blocked cluster RCT, will include 120 teachers in total, who will be randomly assigned in spring 2024 and 2025, respectively, to the treatment and control conditions with equal probability within schools. For Impact Cohort 1, treatment teachers will participate in MC training in summer 2024 and implement the MC instructional model in the 2024–25 school year; control teachers will continue their business-as-usual practice in 2024–25 and will be offered opportunities to receive MC training in summer 2025 and implement the MC instructional model in the 2025–26 school year. Program implementation in Impact Cohort 2 will follow a similar schedule, starting 1 year later than that for Impact Cohort 1. For this study, teachers are the appropriate unit of assignment because the MCP Program focuses on how individual teachers provide instruction in their own classrooms rather than on schoolwide policies or practices.

One commonly voiced concern about within-school teacher-level random assignment is the risk of contamination, which occurs when some control teachers also receive the treatment.

Although contamination will not affect the internal validity of impact estimates based on intent-to-treat analyses, it may weaken service contrast and lead to underestimated treatment effects. For the proposed study, there is likely to be minimal, if any, contamination. This is because all MC training and supports will target individual treatment teachers and will be provided by MCP staff and mentors who will not interact with control teachers in participating schools. As described earlier, the MC instructional model represents an innovative approach to structure and deliver instruction that is fundamentally different from the traditional mode of instruction. Effective implementation of this new way of teaching relies on the support system provided by MCP that is not available to control teachers. Thus, it is unlikely for control teachers to adopt and implement the MC instructional model on their own.

Powered to achieve a minimum detectable effect size of 0.10 for students' math achievement, the proposed evaluation will include 120 teachers in total across the two impact cohorts who teach Grades 6–8 regular math classes and who plan to remain in their current schools through at least the end of the program year (see Appendix J.5 for details about power analyses). These teachers will be recruited from high-need middle schools that meet both of the following eligibility criteria: (a) are eligible for a Title I schoolwide program and (b) have two or more eligible teachers who are interested in participating in the RCT.

Key Teacher and Student Outcomes. For teachers in each impact cohort, we will use a survey to measure two aspects of their instructional practice that the MCP Program is expected to affect: (a) *instructional adaptations based on student learning needs* and (b) *academic progress monitoring*. We will administer the survey before random assignment (as baseline) and again at the end of the program year, drawing on existing survey scales with sufficient reliability (alpha = 0.86 and 0.74 for the two measures, respectively; see Appendix J.6). Given the focus of the MCP

Program on math teachers in the proposed project, the primary student outcome for the project evaluation is students' math achievement at the end of the program year as measured by standardized state test scores obtained from districts' administrative records, which are considered valid and reliable by WWC standards.[1] We will assess the impact of the MCP Program on both teacher and student outcomes (RQs 1 and 2) and conduct differential impact analyses (RQ3) and mediation analyses (RQ4) with data pooled across Grades 6–8 and across both impact cohorts. (See Appendix J.7 for technical details about analytic methods.)

Potential for Meeting WWC Standards With Reservations. Because we need to conduct random assignment in the spring prior to the program year to accommodate summer training for treatment teachers, the student impact sample will consist of "joiners" (i.e., those who enter study teachers' classrooms after random assignment). According to the latest WWC guidance (2021), any joiners in the impact analysis sample would likely pose a risk of bias if the unit of assignment is smaller than a school, as is the case with our proposed teacher-level RCT. To minimize this potential risk of bias due to joiners, we will ask study schools to place students in classrooms in their usual way during the program year, not accounting for teachers' treatment status. As part of the planned impact analyses, which will be based on all students enrolled in the sections taught by each study teacher, we will examine the baseline equivalence of the two study groups in students' prior achievement and background characteristics and include those baseline measures as covariates in the student achievement impact analysis to address potential selection bias and improve the precision of impact estimates. The impact findings for student achievement based on the proposed RCT will have the potential to meet WWC standards with reservations;

[1] Given the limited scope of this EIR early-phase project, our proposed project evaluation will focus on the primary student outcome (math achievement) for the MCP Program and will not assess program impact on student engagement. However, we plan to interview teachers and conduct student focus groups to examine student engagement in math classes taught using the MCP instructional model (see Appendix J.8).

the findings would not be eligible to meet WWC standards without reservations due to joiners.[2]

E2. Methods That Provide Performance Feedback and Periodic Assessment of Progress

The multicohort design of the proposed evaluation will include regular collections of implementation data from a variety of sources for the three study cohorts. As summarized in Appendix J.8, we plan to collect the MCP Program data, which serve as a valuable source of information about the experience and perceptions of teachers, the MCP site visitors, and mentors regarding the implementation of the program. We also will elicit teachers' feedback on both the summer training and the ongoing supports immediately after the completion of each activity and will collect interview, log, and survey data on teachers' experience with and perceptions about the MCP Program at multiple time points. In addition, we plan to conduct focus groups with a sample of students from all three study cohorts at multiple time points to learn about students' engagement in math classes taught using the MC instructional model. We will review the various types of implementation data collected regularly and share what we have learned from these data with MCP during monthly meetings, focusing on progress made and obstacles encountered in program implementation as well as actionable feedback.

The rich implementation data collected from the pilot cohort will be instrumental in refining the MCP Program and preparing for implementation in a rigorous impact evaluation. The additional data collected from the two impact cohorts during the program year and the follow-up year will allow us to continue to gather feedback on program implementation throughout the evaluation phase. Together, the various types of data collected from all three study cohorts will allow us monitor and assess the progress of program implementation at regular intervals and will

[2] Our teacher impact samples will not include joiners; thus, findings about teacher outcomes from our proposed study and hence the overall study could be eligible to meet WWC standards without reservations. However, the teacher outcomes to be examined in this study are not among the limited set of teacher outcomes eligible for WWC review according to the current WWC *Study Review Protocol* (WWC, 2021).

provide valuable formative feedback to inform continuous improvement of the MC instructional model and the MCP supports for model implementation during the project period. These data also will be used to examine teachers' and students' perceptions of the program (RQ5), assess implementation fidelity (RQ6), and identify factors that may hinder or facilitate the implementation of the MCP Program (RQ7), which will deepen our knowledge about the program and contribute to future program refinement and continuous improvement efforts.

In addition to periodic assessment of progress toward meeting the implementation goals of the MCP Program based on the implementation data collected throughout the evaluation period, we will conduct preliminary analyses of program impact on teacher and student outcomes after the end of the program year for the first impact cohort. Although we plan to conduct our main impact analyses after the end of the program year for the second impact cohort based on data pooled across both impact cohorts, preliminary analyses based on the data from the first impact cohort will allow us to conduct an interim assessment of progress that treatment teachers and their students are making toward achieving the intended outcomes.

E3. Clear Articulation of Components, Mediators, and Outcomes and Thresholds

The design of the proposed evaluation is informed by clearly articulated key program components, mediators, and outcomes as depicted in the conceptual framework presented in Exhibit 2 and Appendix G. As the conceptual framework shows, the MCP Program includes two key components, each having multiple subcomponents. The first key component is the MC instructional model, which includes three subcomponents: (a) personalized learning activities, (b) individually paced learning based on mastery assessment, and (c) coordinated digital and physical learning environments. The second component is teacher supports, which include two subcomponents: (a) summer training and (b) ongoing support. Together, the two key components of the MCP Program are expected to improve teacher practices with respect to both *instructional adaptations based on student learning needs* and *academic progress monitoring.* These teacher outcomes are hypothesized to mediate the impact of the MCP Program on student outcomes (engagement and math achievement; see Appendix J.7 for details about mediation analysis).

For the proposed evaluation, we have specified initial measurable thresholds for acceptable implementation for both the MC instructional model and associated teacher supports, which will be used to address RQ5 about the fidelity of implementation of the MCP Program. We will work with MCP and draw on the implementation data from the pilot cohort to finalize the fidelity thresholds and apply them to the impact cohorts. For the MC instructional model component, we anticipate that acceptable implementation will require meeting the following thresholds for the three subcomponents of the model: (a) teachers provide personalized instruction according to the MC instructional model for at least half of their math units; (b) teachers use mastery-based assessments to determine when students can progress to the next lesson for at least half of their math units; and (c) teachers coordinate use of their LMS and physical environments to provide personalized instruction and support for students in those units.

For the teacher supports components, acceptable implementation requires the following: (a) MCP implements the summer training and feedback activities for all treatment teachers in the two impact cohorts as planned; (b) at least 90% of all treatment teachers complete the summer training, including all the required feedback activities; (c) MCP implements all the ongoing supports as planned, including all discussion groups, site visits, mentor consultations, and availability of online resources; and (d) treatment teachers in the two impact cohorts participate in at least 80% of the discussion groups, mentor consultations, and site visit activities.

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