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A Qualitative Study of the Developmental Education Strategies in Mathematics Pilot Initiative

Final Report

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Project Staff

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Overview of the Study

Following a request for proposal process, the Massachusetts Department of Higher Education (DHE) engaged the University of Massachusetts Donahue Institute (UMDI) Applied Research and Program Evaluation group to conduct a study of the Developmental Education Strategies in Mathematics (Developmental Math) Pilot Initiative. The study supports program and policy planning by generating insight into the pilot's implementation and preliminary impact on campuses and students. The study yields formative feedback to complement ongoing quantitative analysis of the initiative being undertaken by DHE staff.

The Developmental Math Pilot Program has completed one year of a pilot phase of experimentation and innovation (SY14–15), and campuses were offered the option to continue or revise their pilot implementation in fall 2015.

Research Questions

The study addresses five sets of research questions:

1. **Motivation**: Why did campuses participate in the pilot initiative? What factors led to campuses' selection of alternative mathematics placement criteria?
2. **Implementation**: How did campuses implement their pilot programs? In what ways and to what extent did campuses' actual implementation adhere to or depart from their planned implementation? If actual implementation differed, how so and why? In what ways and to what extent did implementation look the same or different across campuses, and what explanations may explain any differences? What supports and barriers to implementation did campuses experience?
3. **Changes associated with the pilot**: How, if at all, did campus administrative processes need to adapt to support the new model? How, if at all, did implementation of the new model(s) affect classroom instructional practice (e.g., curriculum, pedagogy, assessment)? In what ways, if any, do faculty perceive differences in student readiness or in other student characteristics in classes in which students were placed through the new model?
4. **Reflections on the pilot experience:** How do campus administrators and faculty view the strengths and weaknesses of their pilot approaches at this juncture? From their perspective, how did the pilot approaches compare to the traditional (Accuplacer) enrollment and placement model?
5. **Lessons learned and implications:** What are the lessons learned for other higher education institutions? For the Department? How can implementation of the pilot initiative be improved?

Methodology

This qualitative study addressed the research questions through an integrated data collection and analysis strategy, employing document review, individual and small-group interviews, and a brief online survey.

The study was launched in May 2015 with an initial review of key documents relative to the evolution of assessment policy in the Commonwealth and campuses' plans to implement the fall 2014 pilot initiative. Concurrently, the study team met with the Commissioner and his staff to develop a fuller understanding of the

developmental math context in Masssachusetts and to refine the goals and focus of the study in order to best meet the Department's salient information needs.

In June 2015, the research team developed and administered a brief online survey of campuses, designed to capture descriptions of their planned and actual implementation of the pilot. Using the results of the survey as well as other relevant background documents, the study team collaborated with the Department to identify six campuses that would be invited to participate in a 1-day site visit. Site selection criteria included diversity across sectors, geographic diversity, and a range of approaches to implementing the pilot. Ultimately one campus was removed from the group of selected sites and five campuses participated in the site visit process: two community colleges, one University of Massachusetts campus, and two four-year state colleges.

Site visit planning proceeded through the summer, and in September and early October the research team visited five campuses to conduct individual and small-group interviews with administrators and faculty members who had been involved in the planning and/or implementation of the developmental pilot. Interviewees spanned a range of positions and functions, including chief academic officers, provosts, department chairs, registrars, admissions, advising, enrollment, institutional research, student/academic support, testing, and college-level and developmental math faculty. When necessary, interviews were conducted by telephone with individuals whose availability did not coincide with the site visits.

Interviews followed a semi-structured protocol and were audio-recorded with interviewees' verbal permission. The audio files were stored on UMDI's secure server and assigned a code number, with access restricted to members of the research team. Two researchers transcribed and/or summarized the audio files and used NVivo 10 software to code the data by research question.

Findings are reported in the aggregate and individual campuses and speakers are not identified. Given the small sample and the importance of specific campus conditions, however, it is anticipated that readers may associate some findings with specific campuses.

Findings

For clarity, the discussion that follows is organized by research question, although the reader will note some inevitable overlap between questions. Unless otherwise noted, these findings are grounded in the interviews rather than survey data.

✓ Q1 Motivation

I. Campus participation in the pilot reflected a motivation to comply with the policy directive.

While perceptions varied from individual to individual, campus representatives expressed the overall belief that the Department expected campuses to pilot alternative mathematics placement criteria in fall 2014. Across the sites, respondents described the initiative as "almost a mandate." As described in the Implementation section below, campuses understood that they were granted the autonomy to modify the specific criteria in accordance with the characteristics of their student population, curriculum, and other conditions.

II. To varying degrees, the pilot represented to campuses an opportunity to address concerns about the Accuplacer as a tool to predict student success in college-level mathematics.

Each of the institutions brought to the pilot experience its particular history regarding the use of Accuplacer. Most of the institutions had, for years, been questioning the efficacy of Accuplacer, and some had already replaced it with alternative strategies. Broadly, dissatisfaction with Accuplacer reflected three themes. First, faculty tended to cite a misalignment between the test and the anticipated coursework, sometimes describing Accuplacer as an algebra test. One former faculty member justified the shift to a GPA pilot largely because of this misalignment:

> *Accuplacer is a test of algebra skills but it's used to place students in courses that are not algebra-based. And most of the gateway courses (quantitative reasoning course, liberal arts major course, Intro to Stats) are not algebra-based. You need a little algebra but not a lot. We're not saying everybody should go from high school into calculus based on GPA; it's a baseline, entry-level college-level course, not a high-level STEM course.*

Another faculty member simply commented, "*The test isn't specifically geared to what we're teaching.*"

Second, campus representatives reported concerns that the test produced false negatives, citing suspicions that failure on the test was not predictive of failure in a math class. Frustrations with the test included its inability to diagnose specific learning needs. Typically, respondents noted that because the test is adaptive, students may, for example, have been confounded by fractions, but the test did not reveal which aspect(s) of fractions proved troublesome or offer the student an opportunity to advance beyond fractions. It is notable, however, that respondents tended not to challenge Accuplacer in terms of predicting the success of students who received high scores on the test.

Additionally, some respondents challenged the use of a single data source such as Accuplacer to assess readiness for college mathematics. They cited factors such as possible test anxiety, students' attitude toward the test and/or their degree of understanding of its purpose, and students' disposition on the particular testing day.

Some faculty and administrators cast the pilot in a particularly favorable light, having been persuaded by research and/or their own experience that using a GPA and other criteria would ultimately be beneficial for students. These informants embraced the "entrepreneurial" aspect of the initiative and/or valued the Department's leadership in forging a change. One administrator reflected on the widespread use of Accuplacer across the country and situated Massachusetts in that national context: *"If Massachusetts breaks away from Accuplacer, other states can look to*

us. This pilot gives Massachusetts the opportunity to be a leader nationally if they come up with a better way of placing students. This is a big step."

III. Campuses' selection of alternative placement criteria reflected their individual histories and trajectories.

The five site-visit campuses represent a range of approaches to assessing student readiness for college-level mathematics and serving students who by various measures indicated a lack of preparedness. Accordingly, this pilot built on those past experiences. The following summary encapsulates campus representatives' decision-making processes.

Two institutions relied solely on high school GPA: the two community colleges. They both administered the Accuplacer in addition to review of high school GPA.

- One community college offers a fairly robust developmental math program on-site, comprised of two modalities (computer-assisted self-paced instruction with instructor support, and traditional lecture format). This college followed the DHE guidelines.
- Another community college had, for years, been working to modify its instructional program for lower-level mathematics students, by revising its modular, computer-assisted, self-paced program and by communicating with high schools about curriculum and pedagogy. Leaders of this institution found that they were "well-positioned" to respond to the pilot, noting a philosophical congruence with their prior work.

Three institutions opted for GPA placement criteria in addition to other criteria.

- The UMass campus used high school GPA as well as the results of a placement test that is bundled into their specific mathematics support program (a web-based learning system). Staff at this institution had been working to integrate the web-based program into their overall mathematics instruction but had not used the program's online placement test prior to the pilot. They embraced the opportunity that the pilot presented. Its online capability was important in order to be accessible to out-of-state and international students, and the availability of a free six-month learning module for students was also attractive. This institution did not administer Accuplacer in fall 2014.
- One state university used both high school math GPA and math SAT scores for placement decisions. This institution had been closely examining Accuplacer success for the past five years, and in the course of those years had adopted several innovative strategies designed to support student enrollment and success in college-level mathematics. The institution had notably reduced developmental math offerings over the years. Leaders at this institution considered the opportunity to use math GPA and math SAT the next step in their ongoing work to better understand the needs and capabilities of their students. In fall 2014, the university administered Accuplacer only to those students who failed to meet math GPA and SAT thresholds.
- The other state university had not yet experimented with alternative criteria and so followed the DHE guidelines for the fall 2014 semester, while also using an SAT math cut score and a math course taken during the senior year of high school. Leaders reportedly instituted these additional criteria in an effort to ensure that students possessed the math content knowledge needed for college-level courses. In fall 2014 the university administered Accuplacer to all students; students majoring in the STEM fields were placed according to their Accuplacer score and students majoring in other fields were placed using the alternative criteria. This institution offers students developmental math instruction through a contract with a community college.

✓ Q2 Implementation

Like the decisions regarding placement criteria, implementation of the pilot varied from campus to campus, reflecting specific conditions (e.g., curriculum, history of developmental math offerings). Data from both the survey and the site visits suggest that actual implementation differed somewhat from planned implementation, largely in terms of the number of students participating in the pilot (somewhat lower actual participation rates). Site visits suggest that logistical constraints account in part for this difference (e.g., difficulties obtaining high school transcripts) as does student choice, to the extent that some students who were offered the choice of enrolling in college-level or developmental math opted for the latter. It is important to note, however, that site visits revealed a greater level of detail than the survey about each institution's implementation, and so the following discussion draws solely on site visit data.

The following discussion presents some commonalities and differences.

IV. Implementation differed across sites in terms of the organizational entities that led the effort and communication across various constituencies.

At some campuses the initiative was associated with a particular organizational unit, such as Admissions or Advising/Academic Affairs, and a specific administrator was charged with organizing the work. At other campuses, an interdisciplinary team was already in existence or was constituted to plan and coordinate the various efforts required by the initiative. Communication about the pilot varied across campuses, such that in some instances faculty members were unaware that the initiative was underway or they were unfamiliar with the specific components of the pilot on their campus.

V. Institutions encountered a number of barriers to implementation, largely related to the timing of the initiative and the start-up of new administrative processes.

The Board of Higher Education approved revisions to the 1998 Common Assessment Policy in December 2013 and campuses were asked to begin planning for the fall 2014 pilot at the beginning of spring 2014. Consistently, administrators and faculty reported that the springtime announcement of the pilot was problematic, giving them little time to prepare for implementation and to manage the changes that the pilot induced. In some cases, testing and orientation plans were already underway, and in others, students' schedules may have already been determined but the new criteria offered them different placements. For some students, changing the schedule was a formidable challenge, especially if work schedules and child care schedules had already been set.

Administrators noted a range of issues related to the fast turnaround: registrars were required to add new sections of college-level courses much later than they usually would, and department chairs contended with unforeseen hiring demands, some reportedly filling positions much later in the summer than they typically would. Overall, community college representatives described patterns of late applications, with a notable percentage of students applying as late as August for fall enrollment. In these instances, campus staff were challenged to institute new processes within an already short timeline.

By far the greatest challenge to implementation—exacerbated by the rapid timeline—related to the practices of acquiring transcripts and managing GPA data. Community colleges, in particular, which had not requested transcripts prior to this pilot, encountered a number of difficulties. Some high schools refused to provide transcripts, despite repeated requests, and if they did, campus staff were pressed to review the transcripts as quickly as possible, given students' deadlines for registering for certain courses. Some campuses permitted students to deliver their own transcripts.

Some institutions assumed an additional burden by opting to recalculate students' GPA, correcting for vagaries across schools such as the use of different scales. Students whose high schools did not calculate GPA were handled differently; some campuses opted to calculate a GPA for them and some campuses removed these students from the pilot. Most of the campuses reported that the transcript review process is done manually,

emphasizing the time needed to accomplish those tasks. One administrator commented, for example, "*Going through lots of transcripts was a challenge. This was in addition to regular work.*" Others noted additional infrastructure constraints; for example, one administrator explained that transcripts are housed in a different building than Admissions and that, since digital imaging is not available, a staff member spent time going back and forth from one building to another.

At all the campuses, staff reported that they encountered a number of IT-related challenges. The pilot posed a number of new information needs, and meeting those needs required close collaboration with the IT department. These needs included the creation of new codes and fields (e.g., pilot participation) and the modification of information infrastructure so that student data could be easily accessed by a range of individuals. One campus reported, for example, that students' GPA had to appear on the correct "page" of the student database so that advisors could appropriately guide students toward course enrollment.

In addition to specific administrative processes, such as analysis of transcripts and IT modifications, campuses were typically challenged with developing new communication and coordination processes and mechanisms. The need for a unified message across the campus community was cited by a wide range of administrators, and many emphasized that the scope of the initiative was broader than anticipated. They pointed to the need for coordination between departments such as admissions, advising, the registrar, testing services, the mathematics department, IT, student support services, and multiple colleges. Reflecting on the scope of the initiative, one administrator commented, "*The entire college community needs to be educated on this.*" Administrators found that coordination of multiple tasks within a short time period, and without additional resources, placed a notable burden on campus staff. The degree to which campuses achieved their goal of communicating a consistent message to students and families appears to have varied from campus to campus. It is notable that the Department anticipated that campus effort would be associated with the initiative and requested Performance Improvement Fund resources. While funds were received, these resources were insufficient to allocate toward developmental math efforts.

✓ Q3 Changes associated with the initiative

VI. While campuses were not expected to have conducted formal analyses of student data, some campuses have tracked course completion and performance for the fall 2014 semester. Overall, they observed that students placed by the pilot criteria performed on par with students placed by Accuplacer.

Clearly, the tentative and incomplete nature of these analyses cannot be overstated; on some campuses faculty prepared these data analyses, while on other campuses faculty were unaware that new criteria had been used and/or did not know which of their students had been placed by these criteria. On still other campuses, the analyses were conducted by institutional research staff, admissions staff, or perhaps others. And faculty and administrators themselves were quick to acknowledge that the very limited timeframe (one semester) offered an insufficient basis for broad conclusions or predictions. Given these caveats, however, patterns described in the field suggest that overall, the students who would likely have been placed in developmental math have completed college-level coursework on par with their peers who were placed using Accuplacer.

VII. With very few exceptions, faculty reported that they have not modified their course content or pedagogy as a result of the pilot.

Overall, faculty reported that their instruction has not changed, nor their level of rigor, since the pilot inception and that they perceive no notable differences in the levels of preparedness of their students. Faculty on one campus expressed a somewhat different perspective, citing a possible recent and broader trend of underprepared students, although they themselves readily acknowledged that they had not confirmed this trend, and moreover, they were reluctant to explain it through reference to the pilot or any other possible cause.

VIII. Four of the five campuses reported shifts in course offerings as a result of the pilot, showing fewer developmental math courses and more credit-bearing courses.

As noted above, these shifts may have already been underway when the pilot was launched, but campuses (with one exception) have consistently been enrolling more students in credit-bearing courses, through 2015 in some cases. Some campuses have noted other trends as well, reflecting curriculum revisions to some extent, and messaging to students overall. One community college has observed, for example, declining enrollment in their "math for liberal arts" courses because students are choosing statistics courses instead. Administrators at this college reported having modified their support services in an effort to ensure that students succeed in their courses by, for example, restructuring their funding targets. They have employed fewer developmental instructors over time, and have instead allocated resources to supplemental instruction. An administrator commented:

> *We are [making these shifts] without compromising students' ability to do well in their [college-level] math courses. . . . [Our institution] has to "hustle" for resources. Enrolling people in credits gives you a way to charge, which you don't have when you are providing supplemental instruction or tutoring. It's much better for the students and it's much better for the larger goal of persistence and graduation. Developmental coursework is not what we should be doing.*

Some institutions have used the alternative placement criteria as a tool to guide students toward mathematics courses that align with their individual goals and interests. Administrators and faculty on some campuses have aligned student performance—as measured by their various criteria—with specific courses and course tracks. For example, students whose scores hover at the cut point on one criterion but who meet another criterion may be directed toward a college-level course with accompanying supports. The pilot criteria reportedly allow advisors and administrators a deeper view of the student's specific math requirements (taking into account factors such as intended major) and a fuller discussion of how best to support student progress in light of those specifics. A few institutions are in the process of developing and revising their mathematics curricula in an effort to contextualize their offerings to changing student needs (e.g., quantitative reasoning courses, pathways courses, and courses aligned with particular programs and majors). One administrator at a community college commented, *"Lots of departments want to broaden the role of math. . . . [S]ocial science faculty are more interested in quantitative work, so they care about their students being good at math."*

✓ Q4 Reflections on the pilot experience

IX. Overall, administrators and faculty affirm that the use of alternative placement criteria holds promise; the fears that some pilot participants brought to the initiative have not been realized and some preliminary results appear to be positive.

To varying degrees within and across campuses, administrators and faculty are comfortable with the use of the high school GPA and other criteria. Campuses appear to have continued their pilot approaches in fall 2015, with perhaps only slight modifications. It is notable that math faculty were typically identified as the strongest detractors when the initiative was first introduced, and that a common concern was the use of a general GPA rather than a math GPA. Faculty who were interviewed did not suggest that they still held that belief, persuaded in part by their own experience and the limited student data they may have seen at their own institution. Across institutions, faculty and administrators do express markedly more confidence in the 2.7 GPA as opposed to the 2.4–2.69 score, and some institutions eliminated that lower criterion in fall 2015.

X. While all campuses cast their pilot year as a learning experience and identified areas for improvement, certain factors appear to be associated with successful implementation: integration and coordination across departments, consistent messaging, and buy-in from campus-wide stakeholders, including the mathematics department.

As suggested above, the reach of the pilot was extensive, and administrators and faculty who brought working relationships and established procedures to the experience may have been somewhat better prepared than their colleagues on campuses with less integration across departments. One campus, for example, was able to establish a weekly "Developmental Math Transition Team" meeting with relatively little difficulty because the individuals in question had a history of collaborating on prior campus-wide efforts.

Similarly, campus representatives consistently emphasized the need for a unified message. Campuses that had already been articulating to students messages consistent with the goals of the initiative were well-positioned to integrate the new placement criteria into their advising and enrollment structures. One state college, for example, had a "start on track, stay on track" campaign underway, intended to set the expectation that students would graduate in four years and that one step toward that goal was enrollment in a math class in the freshman year. Several departments on campus had already been participating in this informational campaign, and so the pilot was viewed as a logical next step. An administrator explained, *"We're trying to get everyone normed around getting students to graduate in four years. And placing fewer students in [a] developmental path helps promote the expectation that they will graduate in four years."*

Some campus staff identified broad-based support for the initiative ("buy-in") as critical to their successful implementation. Buy-in was reportedly enhanced by a few factors:

- the public endorsement of the work by senior-level campus administrators (e.g., provosts) coupled with their participation in the actual planning and implementation of the work;
- the involvement of trusted campus representatives in the statewide Task Force on Transforming Developmental Math Education and/or in other state-level planning conversations, and their discussion of the research that justified the shift to innovative placement criteria;
- and the involvement of math faculty in the Task Force and/or other state-level meetings.

Some administrators commented that math faculty were reassured by the involvement of their colleagues in the planning work because they trusted that the colleagues would not support recommendations that were not in the best interests of the students. One administrator noted additionally that the college's history of involving math faculty in ongoing curriculum revisions may have contributed as well to the faculty's positive orientation to the pilot. The college had been working on accelerating and modularizing its developmental math courses with full involvement from the faculty, and so this initiative was perceived as a logical extension of that work.

Representatives of smaller institutions typically cited their size as a key factor in their successful implementation. They are arguably better equipped to administer logistical tasks, such as analyzing student transcripts manually, but more importantly, they may more easily coordinate and communicate across departments and thereby deliver a unified message to students and their families.

Some campus representatives identified the analytic potential that the high school transcript represents. They anticipate continuing to explore how best to use the information provided in a transcript with respect to advising and course placement. Additionally, some campuses reported that having established communications and working relationships with high schools has been beneficial. These efforts correspond well to the Commissioner's goal of increasing alignment between PK-12 and higher education.

✓ Q5 Lessons learned and implications

XI. While administrators and faculty largely expressed cautiously optimistic perceptions of their first-year experience with the pilot, the study revealed a call for an expanded public dialogue about the rationale for the pilot and the important questions it has raised.

As noted above, the reach of the initiative was broad, bringing multiple segments of the campus community together. While several individuals familiar with the planning phases of the initiative valued the participatory nature of those early mechanisms (e.g., Task Force), it appears that the content and spirit of that foundational work has not been fully communicated to the many stakeholders currently responsible for implementing the initiative. Likely for multiple reasons, some administrators and faculty who sincerely question which approach is in the best interest of students appear not to have been exposed to the national research or the Task Force report. At the same time, the initiative appears to have provoked deep thinking and raised important questions across campuses. One interviewee suggested that, while professionals in elementary and secondary education may have become accustomed to waves of reform that touch all aspects of teaching and learning, higher education is only now experiencing such a wave. This interviewee and others suggested that these changes are now provoking new conversations across campuses, centered on topics such as the evolution/future of developmental math; the changing purpose of an introductory or non-major mathematics course; evolving strategies to "grow" and deploy mentors, tutors, and other supplemental instructors; and the anticipated impact of PARCC testing on college placement practices. These informants call for an informational campaign, designed to educate parents and guidance counselors and others about the rationale for the policy changes ("why this could be good for students") as well as an invitation to "rich and broad dialogue" among professionals.

XII. Overall, study participants would support continuation of the policy initiative, assuming that statewide results mirror the preliminary trends evident in the field.

Overall, administrators and faculty members expressed hope that the state would follow the same policy direction, although campuses are eager to compare their performance to overall statewide trends. Citing the implementation challenges noted above, interviewees noted the ongoing need for resources to support the work. Additionally, some campus representatives expressed curiosity about other institutions' pilot experiences and noted that support in the form of an electronic database could enhance campuses' abilities to learn from one another.