

# *NROC Developmental Math-An Open Program* Pilot Studies Report

## Introduction

The *NROC Developmental Math-An Open Program* (DM-AOP) project<sup>1</sup> is an effort to develop and distribute a multimedia-based developmental math program that addresses the shortfalls of the current educational approach. With only 22% of US community college math remediation students completing a degree or certificate, it is clear that we need to rethink how we teach developmental math.

The DM-AOP design and development was guided by regular, detailed feedback from the three primary stakeholders in developmental math education: school administrators, math teachers, and math students. Via 68 focus groups conducted during the nearly three-year planning and development effort, the majority of the features of the DM-AOP technology, curriculum, pedagogy, media, and business features were guided by users. The most detailed and directed feedback came from students, addressing everything from the text and spoken language and graphical approach to the examples and cultural references employed. The result is a new type of teaching and learning tool for developmental math, flexible for nearly any teaching approach and focused on clear, engaging communication with students (See *Designing Digital Resources for Developmental Math*, a full report of the findings of the DM-AOP focus groups, available at [http://www.nrocmath.org/cms/wp-content/uploads/MITE\\_WhitePaper-Focus-Groups-Summary.pdf](http://www.nrocmath.org/cms/wp-content/uploads/MITE_WhitePaper-Focus-Groups-Summary.pdf) ).

## Pilot Studies

Pilot studies were initiated nationwide to evaluate the DM-AOP program in three ways. First, studies identified and documented educational “use cases,” ways in which teachers and administrator used the DM-AOP materials for instruction (e.g., as part of a “blended classroom”). Second, studies measured student performance using DM-AOP, including traditional measures (e.g., test scores), as well as behavior studies (e.g., measures of math confidence). Finally, administrators, teachers, and students were interviewed to learn their experiences with DM-AOP, especially with regards to the value of the various teaching modalities.

Pilot studies were initiated in the Summer semester 2012, Fall semester 2012, and will be initiated or continued in Spring semester 2013. While more than 50 pilot studies were initiated thus far, fewer than 30 studies were conducted to completion or are still in progress. The reason for the heavy dropout rate was primarily the result of unexpected resource limitations and changes in administrator and teacher personnel. At least part of this poor pilot completion rate also appears to be related to shrinking school budgets that came with the US economic downturn during the period of the pilot studies, 2012-2013 (see Appendix A for a listing of the pilots still being tracked, totaling 26 institutions, 60 instructors, and 111 sections).

---

<sup>1</sup> *The DM-AOP project was co-funded by The William and Flora Hewlett Foundation and the Bill and Melinda Gates Foundation.*

## Use Cases

Four use cases have been developed and an additional 14 pilot studies are being documented as possible use cases. The “case study” format is a description of the student population, learning resources, teaching approach, and (when available) performance outcomes of employing the DM-AOP materials. A number of developmental math class characteristics have been categorized including,

INSTITUTION	High School Community College Technical College 4-year College/University Adult Learning Center	FORMAT	Open Enrollment Semester-system/synchronous Asynchronous
STUDENTS	Mainstream Alternative ELL Adult	LOCATION	Classroom Computer lab Virtual/Online
APPROACH	Traditional Blended/Hybrid Flipped Emporium Self-Paced/Independent		

These characteristics, and others, are being used to frame the case studies documented for both secondary students remediating prior to graduation and post-secondary students facing remediation at entry (see Appendix B for the administrator and instructor intake forms used in the pilot studies). The resultant case studies will be used by schools, systems, and states to inform and guide their use of the DM-AOP program (see Appendix C for a collection of completed DM-AOP case studies, and Appendix D for a listing of DM-AOP case studies being considered).

## Student Performance – Class Pass Rates and Test Scores

To date, sixteen of the pilot sites have provided data measuring the impact of DM-AOP. The remaining pilot sites are expected to provide data at the end of the 2012-2013 school year. Pilot sites collected either class pass rate data or measured changes in exam scores, including placement exam test scores. Analysis compared pass rates or test scores when NROC DM-AOP was not used (often historical data), with pass rates or test scores when NROC DM-AOP was used (as part of various teaching approaches, including traditional, blended/hybrid, flipped, emporium, or self-paced/independent). Four institution types are listed: 1. high schools, 2. community colleges, 3. technical colleges, and 4. four-year colleges.

The following are the results of the pilot studies. The column “Passed” is the percentage of students that achieved an A, B, C, or D grade for the class or received a P in a P/NP system. If no historical comparison data is available (e.g., course taught for the first time), it is listed as “N/A.”

1. High School

<b>Bartram Trail HS, FL</b> Blended/hybrid, Math for College Success	<b>Teachers</b>	<b>Students</b>	<b>Passed</b>
NROC	1	36	92%
<i>Non-NROC historic</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>

<b>St. Augustine HS, FL</b> Blended/hybrid, Math for College Success	<b>Teachers</b>	<b>Students</b>	<b>Passed</b>
NROC	1	30	100%
<i>Non-NROC historic</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>

<b>St/ Johns SD, FL</b> Blended/hybrid, Math for College Success	<b>Teachers</b>	<b>Students</b>	<b>Passed</b>
NROC	1	19	100%
<i>Non-NROC historic</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>

<b>Creekside HS, FL</b> Blended/hybrid, Math for College Success	<b>Teachers</b>	<b>Students</b>	<b>Passed</b>
NROC	1	6	100%
<i>Non-NROC historic</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>

<b>Allen Nease HS, FL</b> Blended/hybrid, Math for College Success	<b>Teachers</b>	<b>Students</b>	<b>Passed</b>
NROC	1	40	95%
<i>Non-NROC historic</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>

<b>Pedro Menendez HS, FL</b> Blended/hybrid, Math for College Success	<b>Teachers</b>	<b>Students</b>	<b>Passed</b>
NROC	1	39	90%
<i>Non-NROC historic</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>

<b>Ka Waihona O Ka Na'Auao School, HI</b> Blended/hybrid, Summer Math Academy	<b>Teachers</b>	<b>Students</b>	<b>Test Score</b>
NROC	3	56	25% improvement in pre and post test scores
<i>Non-NROC historic</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>

<b>CC of Denver, CO</b> Traditional, HS elective course	<b>Teachers</b>	<b>Students*</b>	<b>Passed</b>
NROC	1	7	86%
<i>Non-NROC historic</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>

*\*Students that completed course only*

## 2. Community Colleges

<b>Butler CC, KS</b> Self-paced/Independent	<b>Teachers</b>	<b>Students</b>	<b>Passed</b>
NROC	1	14	71%
<i>Non-NROC historic</i>	1	85	58%

<b>CC of Denver, CO</b> Self-paced/Independent	<b>Teachers</b>	<b>Students*</b>	<b>Passed</b>
NROC	1	20	95%
<i>Non-NROC historic</i>	1	34	68%

*\*Students that completed course only*

<b>CC of Denver, CO</b> Self-paced/Independent, Accuplacer Prep Lab	<b>Teachers</b>	<b>Students</b>	<b>Test Score</b>
NROC	1	9	21-40 point improvement in pre and post Accuplacer score
<i>Non-NROC historic</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>

<b>Ivy Tech Community College, IN</b> Emporium/Independent	<b>Teachers</b>	<b>Students</b>	<b>Test Score</b>
NROC	1	10	100% passed
<i>Non-NROC historic</i>	1	16	<i>50% passed</i>

<b>Chattanooga State, TN</b> Self-paced/Independent, Compass Prep Lab	<b>Teachers</b>	<b>Students</b>	<b>Test Score</b>
NROC	1	7	13-47% improvement in pre and post Compass score
<i>Non-NROC historic</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>

### 3. Technical Colleges

<b>Renton Tech, WA</b> Emporium	<b>Teachers</b>	<b>Students*</b>	<b>Passed</b>
NROC	1	40	88%
<i>MyMath Lab</i>	1	68	91%

*\*Students that completed course only*

### 4. Four-Year Colleges

<b>Jackson State University, AL</b> Blended/hybrid	<b>Teachers</b>	<b>Students</b>	<b>Passed</b>
NROC	1	19	95%
<i>Non-NROC historic</i>	1	134	98%

<b>Jackson State University, AL</b> Flipped	<b>Teachers</b>	<b>Students</b>	<b>Passed</b>
NROC	1	74	85%
<i>Non-NROC historic</i>	1	209	77%

<b>Daemen College, NY</b>	<b>Teachers</b>	<b>Students</b>	<b>Passed</b>
Emporium vs. Traditional			
NROC	1	28	79%
<i>EnableMath</i>	1	48	81%
<i>Non-NROC historic</i>	1	83	76%

<b>UNM Los Alamos, NM</b>	<b>Teachers</b>	<b>Students</b>	<b>Passed*</b>
Emporium			
NROC	1	22	82%
<i>Non-NROC historic</i>	2	63	60%

\* C grade or higher

Totaling all students that participated in the studies.

	<b>Total Students</b>
<b>NROC DM-AOP class</b>	392
<b>Non-NROC DM-AOP class</b>	449

A few trends are emerging from the early DM-AOP pilot data. The trends include,

1. Class pass rates for students using DM-AOP are running from a low of 71% to a high of 100%, averaging 90% (n=320 students in 13 classes); higher than the current pass rates for developmental math of about 60%.
2. Comparing classes using DM-AOP with classes not using DM-AOP (usually historic data), student class pass rates rose from 59.7% to 86.4% (n=265).
3. DM-AOP has been an effective part of traditional, hybrid/blended, flipped, emporium, and self-paced/independent study approaches to teach and learning developmental math, supporting high class pass rates (e.g., HS blended/hybrid at 90-100% pass rates) and improved test scores (e.g., CC self-paced/independent study at 13%-47% improvement in placement exam test scores).
4. In programs that are using other remedial math software programs, DM-AOP achieves the same or better student performance results while substantially lowering the financial burden for students and institutions (e.g., at Renton Tech, My Math Lab: \$125/student/class *versus* NROC DM-AOP: \$1/student/unlimited annual usage) therefore lowering the barrier to usage.

### **Student Performance – Behavior Studies**

Data from the student interviews is currently being collected (see Appendix E for a copy of the interview intake form). These data will be used to better understand the usage and value of each of the DM-AOP media components, as well as the influence of the program on student behavior. The same data were collected for pilot studies of NROC Algebra 1-An Open Course in 2010-2011. That effort revealed a marked improvement in student attitude about math and school (see Appendix F for synopsis of the NROC Algebra 1-An Open Course student behavior findings).

The student behavior findings for the DM-AOP pilot studies will be available Fall 2013.