A Unique Concept—Free, 3-Person, Virtual Model to Bolster Early Learning: Michigan Reading and Math (STEM) Performance

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MI-RAMP, Michigan-Reading and Math (STEM) Performance, a community charity

Abstract

The goal of the Michigan Reading and Math (STEM) Performance, MI-RAMP, program is to uplift marginalized children—ages 4 to 12—both educationally and socially. The wide age range emphasizes a purpose to invest early for the highest rate of return, according to Nobel Laureate James Heckman. MI-RAMP has designed and implemented a free, interstate, 3-person, distance-learning program with 12 weekend sessions. Interactions involving one student and a parent are led by a teacher-tutor (TT). The two-way virtual exchanges are customized, addressing foundational needs in reading, math, and critical thinking. We have demonstrated vital learning via our individualized virtual modes, e.g., a 5-year-old male learning to read after 8 weeks. The MI-RAMP model is replicable to reach countless children.

Key words:
Tutoring, Free, Virtual, Youth, Reading, Math

Introduction

Education and formal learning provide the foundation for the development of skills and capabilities. James Heckman (Heckman, 2008; Heckman, 2006; Heckman, 2016), an economist and Nobel Laureate, emphasizes the skills-to-capabilities connection and relates it to monetization. His studies span ages from prenatal care through retirement. Significant attention has been given to the Heckman Curve, illustrated in Figure 1, where "Rate of Return to Investment (ROI) in Human Capital" versus "Time" is charted. According to Heckman, skills are produced from learning and later translated as human capital; ROI is optimized by investment in people starting with prenatal care, which is critical to his conclusions.

Researchers (Heckman, 2008: Heckman, 2006: Heckman, 2016) purport that investing in children's development from prenatal care through early childhood (ages 0-7) reaps the most benefits. Those benefits are exhibited by:

- Minimized birth defects and better health.
- Improved parental guidance.
- Better fundamentals in reading, math, and critical thinking.

Other studies show that long-lasting excellence is achievable when strong reading and math skills are developed, and high achievement is expected (Brown, 2020; Bryant, 2021; Creative Learning, 2016; Gilmer, 2007). Academic success—at the beginning of new phases, such as kindergarten, high school, or college—promotes momentum and perpetuates success. Recent research (Shi, 2020) emphasizes the positive influence that parent type has on students' math performance. Shi's work typecasts parents into three groups:

a. incredibly involved, commanding/demanding.
b. somewhat involved.
c. less involved.

Shi's research showed that as parents' academic commands/demands increased, students' mathematical performance increased as well. Other studies (Adelman, 2006; Gilmer, 2007) support the importance of math principles, as they show that students who perform better in math are more likely to attend college and have higher graduation rates.

Reading starts early. Children "learn to read" from pre-K to grade 2, then "read to learn" from grade 3 and beyond (Loveless, 2021). That sequence can vary depending on teaching/learning styles, but regardless, long-term, effective, comprehensive reading should begin at a young age, 4-8 years old, or before. The importance of reading, quantitative/problem solving skills, and critical thinking should be stressed during early childhood.

Often, there is little success without a strong foundation in reading/literacy. Our motto "Education, not Incarceration!" is meaningful considering the 'school-to -prison pipeline' is a direct result of one's reading comprehension and persistence to high school completion (Meijia, 2020; Brown, 2020; Levin, 2017).

Numerous investigators have pursued ways to halt and reverse the growing separation in education and earnings between the upper class/middle class and the underclass (Gilmer, 2007; Meijia, 2020; Wisely, 2020; Brown, 2020; Levin, 2017). Some approaches involve providing more educational and social equity. Key separations are based on race/ethnicity and gender differences. There is an unfortunate gap in reading skills between African American (and Hispanic) boys versus girls. For example, 75% of black males in California are behind in reading, which is

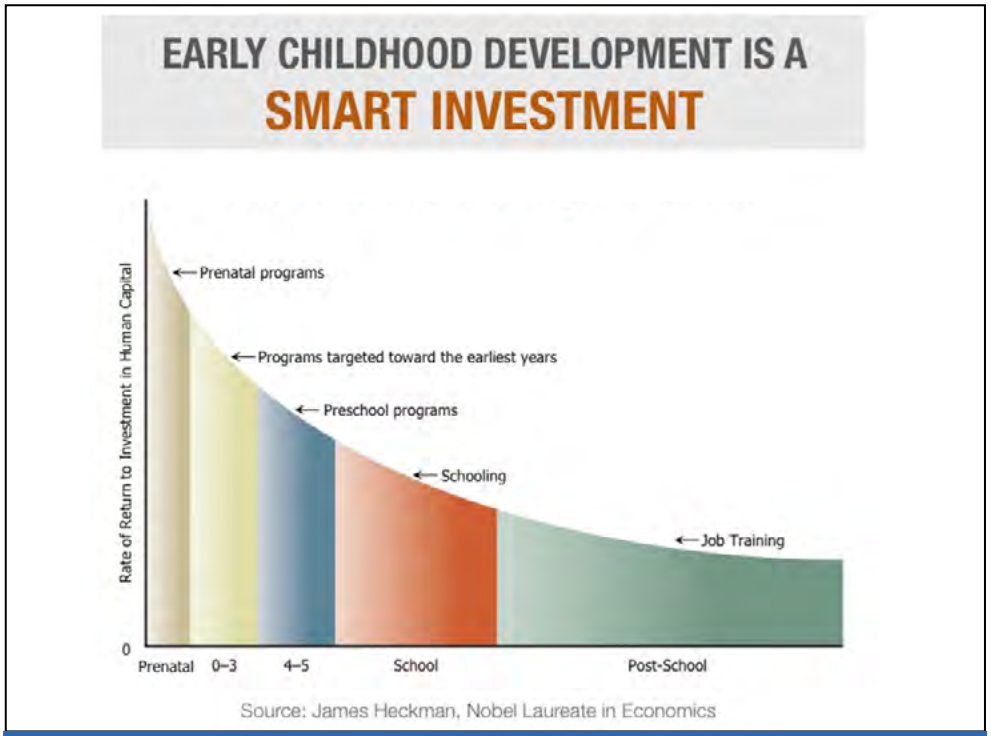

Figure 1. The earlier the investment, the greater the return

substantially more than black girls (Levin, 2017). This gap also exists between sets of kids from other ethnic groups. These shortcomings in reading and education among American black and Hispanic boys are ubiquitous.

Chasms in education affect relative socioeconomic status, health, and lifestyle (Heckman, 2008; Wiley, 2020; Levin, 2017; Creative Learning, 2016; Ravitch, 2020; Bryant, 2021; Leonhardt, 2018; Henderson 2002). In the United States these gaps are clearly indicated by:

- A permanent underclass, primarily, of people of color.
- A preponderance of unwed mothers in lower in come households.
- Increasing numbers of high school dropouts.
- More crime and imprisonment.
- Early failure of K-4 students.
- Inadequate support of many parents of their children.

Work proposed here will address these issues by implementing a supplemental, basic educational program (MI-RAMP) that facilitates joint learning/teaching with students-parents-teachers in a novel 3-person arrangement. The virtual distance-learning program in the triangular arrangement has completed its pilot program with 7 students from greater Detroit, MI and a second cohort with 12 students. Ten children hailed from Michigan and 2 were from other states: one from greater Chicago, IL and another from Los Angeles, CA. The third cohort had 10 young scholars from Michigan.

Methods

As the targeted populations for enhanced learning are young, underserved boys and girls, our initial challenge was selecting and recruiting youth most in need. In developing a consistent application, we included key queries and requirements:

- Age range for children: 4-12 years
- Child eligibility for the federal USDA free/reduced school meals program
- Parents must attend and participate in all "classes"/meetings: virtual and/or in-person.

We aimed to consider all youth and had a firm commitment to have each cohort contain inclusion of children from any community, but one-half or more, would be impoverished. MI-RAMP followed the federal definition for impoverished: qualifying for USDA free/reduced school meal plans.

President Biden and the Chicago Public Schools and Florida Schools Systems (Bryant, 2021; Kim, 2012; Al Mahdi, 2019; Leonhardt, 2018; Leonhardt, 2021; Henderson, 2002) have been stressing the positive influence that parental involvement, community involvement, community schools and mandatory preschools have on the overall educational system and economic security. Those goals are in line with MI-RAMP's mission.

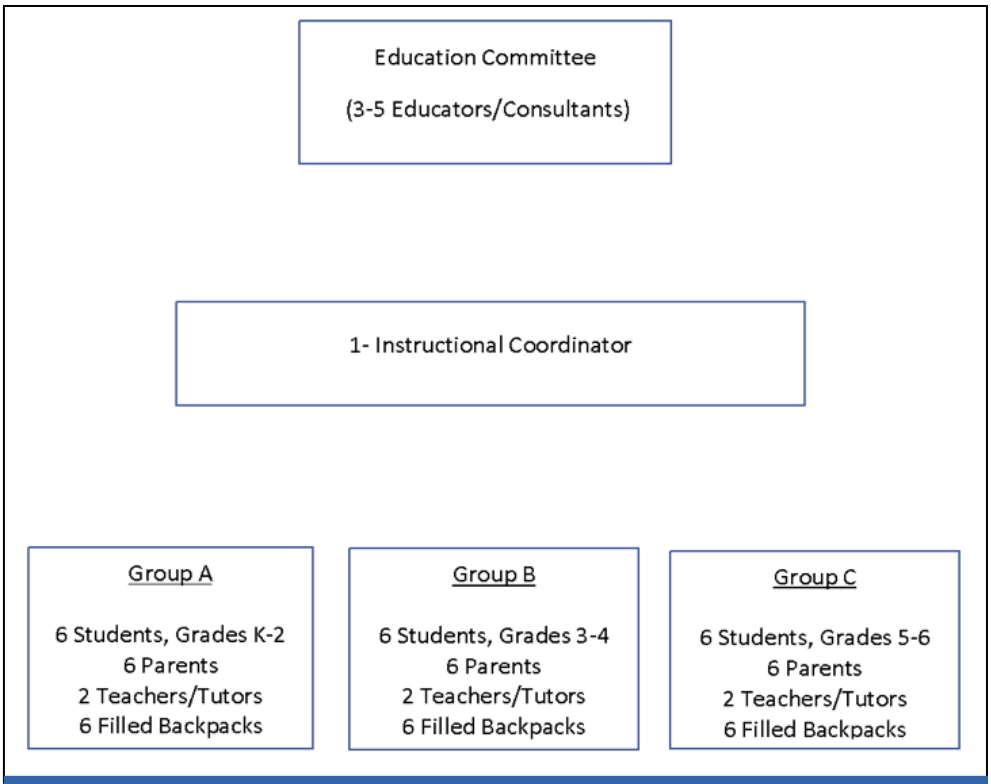

Figure 2. MI-RAMP Class-Related Structure

A. Initial Proposed In-person Model

At the conception of the MI-RAMP community charity, central to its program were in-person teaching-learning experiences in a triangular manner with:

1. Students;
2. Parents;
3. Teachers(tutors).

See Figure 2 for the design of that in-person model with three groups corresponding to grades:

A. Pre-K to 2, B. 3 to 4 and C. 5 to 6. As shown, the teach er to student ratio was high, 1 to 3.

Parents would also attend each 90-minute Saturday class (which was slated for Saturday for 20 weeks).

The focus would be fundamentals in:

- Reading
- Math
- Critical thinking
- Respect for self and others
- Accepting those who are different.

To assist with the recruiting and learning, we equipped each student with a backpack and age-appropriate learning tools. A typical package for a pre-K student is shown in Figure 3 with learning tools such as sight words, numbers table, books, etc.

As part of the initial in-person program, scheduled to start July 2020 with its first cohort of 18, learning would continually be monitored, results would be collected and reported during the 20-week session. Suggestions, as post-analysis information, would be incorporated into the subsequent offering. Due to the emergence of COVID-19 in the spring of 2020, the MI-RAMP in-person programs were postponed, and MI-RAMP redirected efforts to a distance-learning program.

B. The Active Distance-Learning Model Program

Figure 4 illustrates the structure of the current MI-RAMP distance-learning program, where the interactions assure a trialogue between one student, one parent, and one teacher (teacher-tutor, TT).

Figure 3. Backpack with Age-Appropriate Learning Tools

Figure 5 shows an active virtual session with student-parent viewing a monitor with the TT leading a weekend 30-minute session.

This arrangement allows for ongoing dynamic exchanges where the TT is the lead person but accepts input and suggestions from the parent to reach learning targets for the child. Each 30-minute weekend "class" of a set of twelve meetings is conducted virtually (ZOOM, Google DUO, FaceTime, etc.). Normally each "class" has 15 minutes devoted to reading and 15 minutes to math. There are learning targets for each time which have been directed by the TT with some input from the parent, and/or child. These learning-teaching moments are customized to reach the student's needs and at his/her level. Progressions from week to week are monitored. Outcomes are recorded and reported to the Instructional Coordinator.

Pre-onset of the virtual program, parents and children were surveyed to determine their perceived needs and expectations from MI-RAMP. At the end of the 12-week session, the parents and students were more thoroughly surveyed with a questionnaire to obtain explicit feedback as to the strengths and potential areas of improvement of the program. See Appendix A for the 10-question survey. Conclusions from the survey are discussed in the following sections.

Results

MI-RAMP designed and has successfully implemented a unique distance-learning program for young children, ages 4 to 12. It is guided by talented teachers-tutors and assisted by the children's parents. The unique tri-person structure is pictured in Figure 4, showing 12 sets of separate interactions, but our model set contains three people: one child, one parent, and one TT. Each 30-minute "class" produced some learning on the part of each child and some learning by the parent. The child's learning is both qualitative and quantitative in the focus areas of expanding the fundamentals in reading and math with critical thinking occurring. The parents' learning is often demonstrated through teaching techniques— with provided learning tools—to assist in improving their child's reading and math acumen. The parents' learnings can be used beyond this virtual setting and time. For example, they can be used with follow-up studies and work in math and reading with that young scholar or another child that the parent is raising, as shared with the MI-RAMP staff.

As Table I shows, after 8 weeks, one 5-year-old (Pre-K) learned to read for the first time. The TT started by exposing young children to various sight words.

The cumulative numbers of sight words recognized from week to week were tracked. The upward pattern is depicted in Figure 6.

During the 8th "class," the words "Where is mom?" were projected via Google Duo for the child and parent to see. The child verbalized them and responded with-

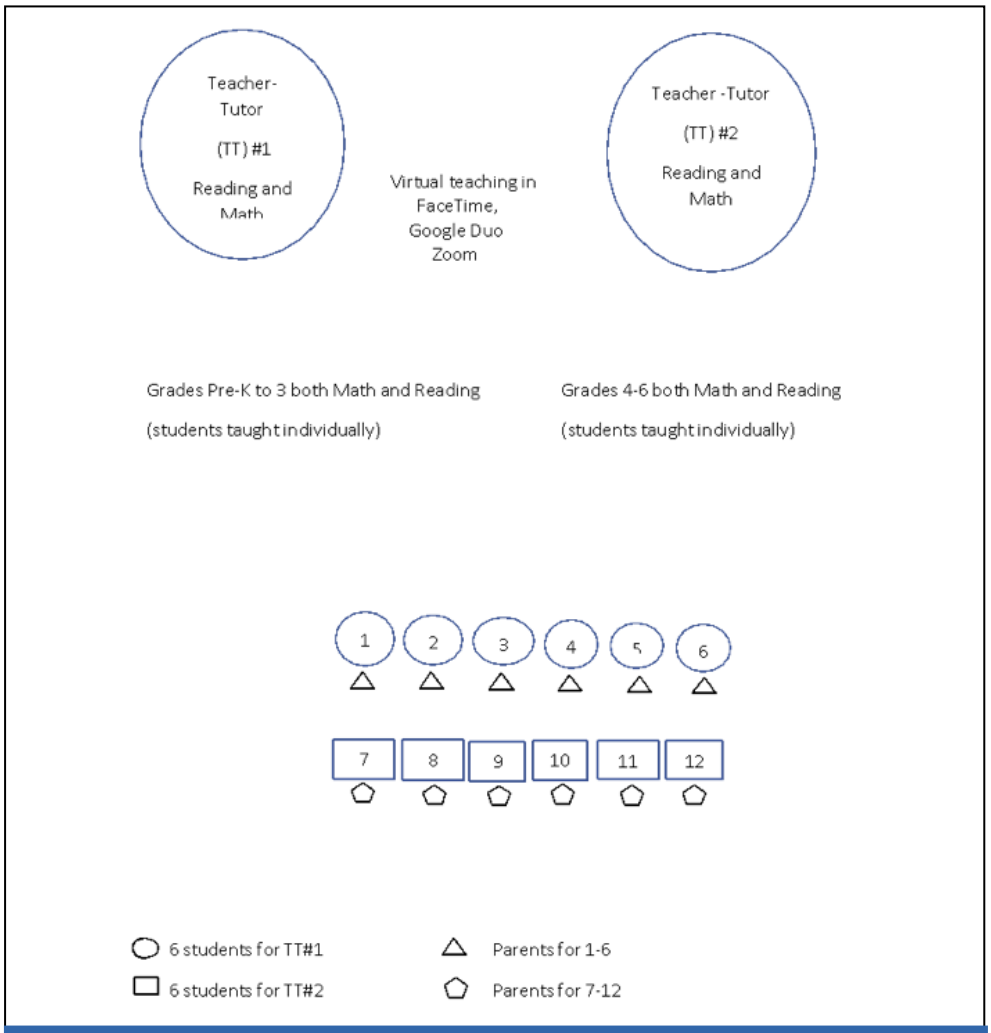

Figure 4. Distance Learning Schematic - Cohort #2

Figure 5. Seven-year-old in Virtual Sessions

out being prompted, "Here is mom," as he looked toward his mother and touched her. This 5-year-old had read and comprehended for the first time. He read one more 3-word sentence and responded, "Reading is fun. Let's not stop."

This example illustrates a reality and challenge for the disadvantaged. Many underserved children from single-family homes do not get early exposure to academic fundamentals. Many children at age 3 or 4 who have early exposure are readers.

Another example was demonstrated by a 5-year old's late exposure and delayed understanding of math concepts: simple counting from 1 to 100. As Figure 7 and Table II show, he was only able to count to 13 at the start of the term.

Most weeks (Saturdays) he would practice counting during the 15-minute math period and later during the week the mother would follow up with counting routines and other math building exercises. In general, he was unable to proceed from decade to decade where he would show hesitation in progressing beyond 29 or 39 or 49. The concept of skip counting by 2's, 5's and, most importantly, 10's was reviewed and practiced. He was able to skip count by 10's to 100, but still not fluidly and consistently count beyond 49. During and at the end of his first 12-week term, he counted to 49 though he apparently knew that the next decade was 50. See Table II where 49 is the maximum number counted to. Our learning target was 100.

The two studies above illustrate the importance of learning the basics which should help prepare young children for the demands of more advanced reading and math.

Cohorts 1, 2 and 3 had 29 total children (18 males and 11 females). Among the 29 (26 Black and 3 Hispanic), 26 of 29 were from single-parent households: the mother—with one exception—being head of household. Undoubtedly, this profile matches those most in need and poorest. We observed that these single parents had several demands on their time, which negatively affected their weekend attendance with MI-RAMP.

Those personal challenges, such as working two jobs, looking for work, lacking an effective support network, etc., hindered attendance. Due to these personal challenges and as explicitly stated by 3 mothers, they withdrew their 4 boys which lowered our retention as shown in Table III where we retained 71.4% (5 of 7) in cohort #1, 83.3% (10 of 12) in cohort #2, and 80.0% (8 of 10) in cohort #3 for an overall average retention of 78.3% (23 of 29). Table III displays these retention values for cohorts 1-3, along with the numbers of students accepted. Projections for future cohorts 4-6 are also shown where we should have 14-18 young scholars per cohort.

Discussion

As described above, three general achievements are covered:

- The design/implementation of the inaugural 12-

Weeks	# Of sight words recognized	Sentences read	Date, 2021
1	2		2-Jan
2	4		9-Jan
3			16-Jan
4			23-Jan
5			30-Jan
6			6-Feb
7	9		13-Feb
8	11	2	20-Feb
9	18		27-Feb
10			6-Mar
11		2	13-Mar
12			20-Mar

Table I. Sight-Word Progression Toward Reading

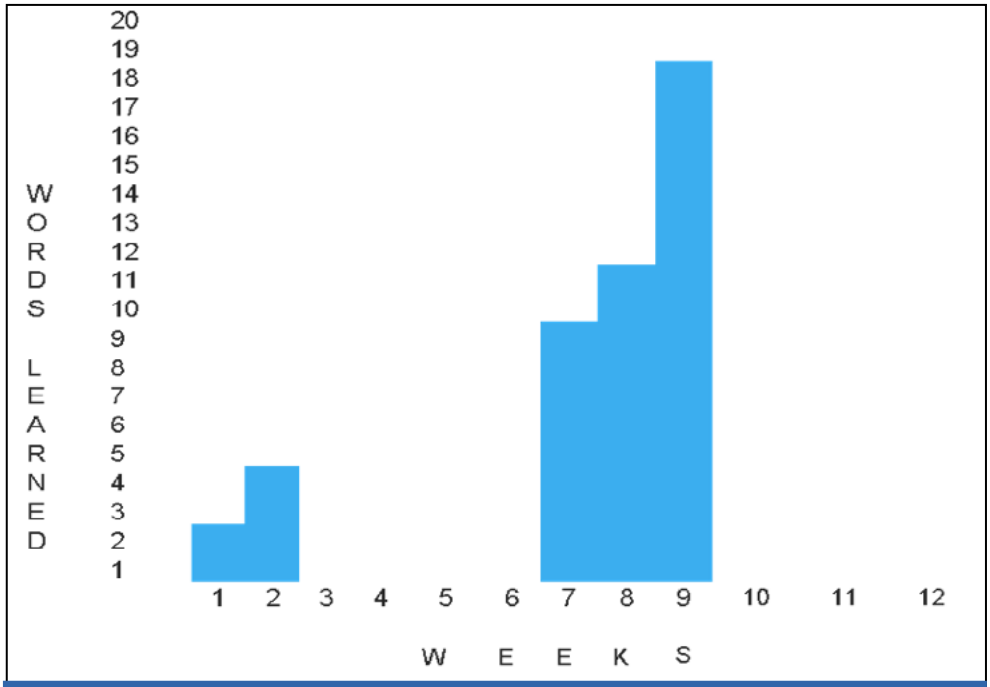

Figure 6. Word Progression of Pre-K Scholar in Cohort #1

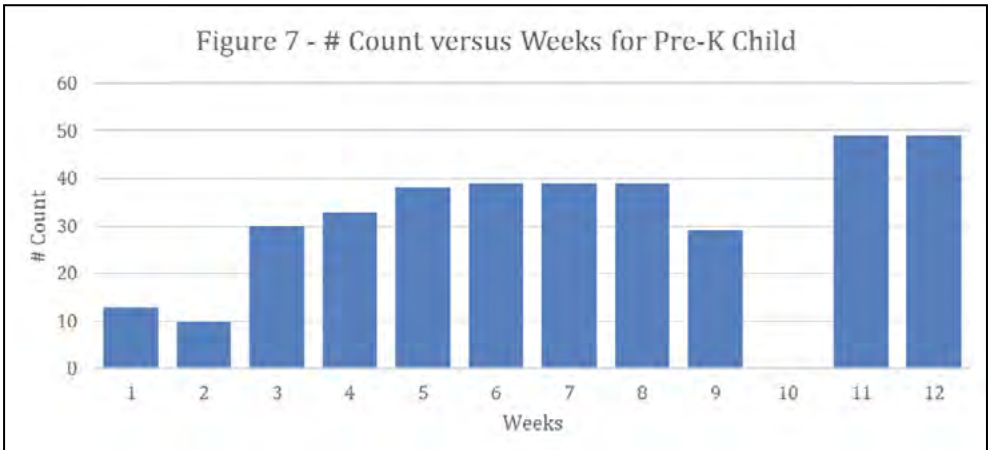

Figure 7. # Count versus Weeks for Pre-K Child

week, 3-person virtual learning program.

- Completion of expanded second and third cohorts for distance learning.
- Early learning of youth from ages 4-12 with parental involvement.

Much thought was put into which students to recruit and admit into our inaugural program, which launched December 2020. Even more thought was put into 1.) what important fundamentals to teach, 2.) how to retain the admits for 12 weeks, and 3.) how to encourage them to return to future offerings. Program acceptance was based on age range (4-12), socio-economic status for at least half of the admits (½ or more must be underserved) and parents must participate in all weekend meetings. The learning-teaching sessions or "classes" were customized to the needs of each child with input from the parent. Without exception all the parents agreed with the action plan for their child as described on day one of the programs and further clarified by the second meeting. These plans were our learning targets which had 3 classifications:

1. Learning targets for the day in reading and math.
2. Learning targets for the week (or from current Saturday class to next Saturday), per agreement, the parent is to follow up at least 2-3 times on weekdays with the key areas covered the past Saturday.
3. Learning targets for the entire 12-week term.

In category #1 above, for example for a 5th grader, the first learning target in math could be determining which multiplication facts the child has command of by memory. The child, parent, and TT would simultaneously learn the level of command of the 12 by 12 matrix for the multiplication table. If total command were shown, the progression and customized teaching would proceed to something more needed, appropriate, and timely, e.g., long division, percentage, decimals, fractions, exponents, algebraic expressions, etc.

During the first session, the student would have received a backpack with learning tools, including two age-appropriate books. The child and parent would decide which of those two books to read initially and proceed with their choice or agree upon any other book they preferred. A typical target would be to read that book and agree on a few books to read during our 12-week term, or at least number of minutes to read each week (Monday through Friday, before the next weekend MI-RAMP "class").

As observed by and recorded by the TT's, all 19 young scholars learned some aspects of reading and math fundamentals, e.g., their vocabularies grew, or their command of multiplication/division facts improved. While a few did not reach the learning targets, most met or surpassed mutually set goals.

Appendix A shows the questionnaire that parents returned to a survey coordinator who compiled their objective ratings and subjective comments. In summary, the parents expressed extreme satisfaction with the MI-RAMP distance-learning program and rated several questions with their level of agreement on a 0-4 scale: 0 denotes high disagreement, while 4 denotes very high agreement.

Weeks	Max #	Counted by 10's	2021	2020	Orientation
0				19-Dec	Backpack drop-off with learning tools
1	13		2-Jan		
2	10	20	9-Jan		
3	30		16-Jan		
4	33	40	23-Jan		
5	38		30-Jan		
6	39	70	6-Feb		
7	39	100	13-Feb		
8	39	100	20-Feb		
9	29	100	27-Feb		
10			6-Mar		Absent this week (illness)
11	49	100	13-Mar		
12	49	100	20-Mar		

Table Ii. Learning To Count, Pre-K Mi-Ramp Young Scholar

Year	Month	Start day	End day	Cohort	# of young scholars	# of weeks	Young Scholars Completed	% retained	Virtual
2020	Dec	21		#1	7		5	71.4	YES
2021	March		20			13			YES
2021	April	2		#2	12	12	10	83.3	YES
	June		26						YES
2021	July	24		#3	*10*	12	8	80.0	YES
2021	Oct		23						YES
2021	Nov	20		*#4*	*14*	12			Yes
2022	Mar		5						Yes
2022	Apr	5		*#5*	*18*	12			Yes
2022	June		25						Yes
2022	July	23		*#6*	*18*	12			Yes
2022	Oct		22						Yes
TOTAL					79				

Table Iii. Mi-Ramp Cohorts, Current and Projected (10/25/2021)

Fourteen of nineteen, 73.1%, of the parents who had children in cohorts 1, 2, and/or 3 returned the optional anonymous 10-question survey shown in the Appendix. Questions were graded on a 0 to 4 scale. The average scores for each question ranged from 2.9 to 3.9, or from "B" to "A," with an average score of 3.6. The 2.9 indicates for question #5 ("my child's reading improved") that some improvement should be planned in the next session or cohort #4. Those efforts will be undertaken with more explicit outcomes for reading, such as assuring that each child has interest in the selected books and reading-related approaches, and accordingly should read more/learn more/comprehend more.

Four questions earned parental ratings at the 3.9 level ("A; those being questions #2, #4, #7 and #8:

- TT was knowledgeable about subject matters.
- MI-RAMP staff was helpful in communicating and assisting in my needs.
- I am satisfied with the assistance received from MI-RAMP.
- I would recommend MI-RAMP to other families.

The MI-RAMP distance-learning program has been implemented. It is in a third iteration to optimize student learning, parental involvement to bolster learning. The virtual program has demonstrated its utility as a model and can be replicated for further outreach.

Acknowledgments

Eric Brown was instrumental by:

- Helping to brand MI-RAMP with the motto, "Education, not Incarceration!" as he linked youth illiteracy to failure and routes to prisons.
- Organizing a 5K Walk/Run for Literacy which benefitted MI-RAMP financially and with student recruitment.

The 4 authors thank the 27 talented and diverse Board members (see mi-ramp.org for specifics), who represent men and women from eight states (MI, OH, IL, NY, TX, MD, CA, FL) for their most professional voluntarism. In addition, much gratitude is extended to our administrative assistant, Phyllis A. Gilmer, who served in numerous ways while creating the MI-RAMP acronym along with Edward Broom Jr., Glenn Jackson, and Staci Rose Newton. Victoria Washington, Lory Armstrong and Ryan Swanson performed excellently as teachers-tutors, as did substitute TT Staci Newton. Secretary Ron Bettie must also be commended along with our financial overseers, Spencer Stanfield, Ed Broom and Ernest Reed. Legal advice was provided by Judge Richard Smart Jr. Pam Parks was an excellent student recruiter coordinator.

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Numerous donors gave monetary gifts and gifts-in-kind which allowed MI-RAMP to proceed with tangible virtual programs and plans for viable in-person teaching-learning programs.

Declaration of Interest Statement

There are no financial or personal interests that could affect the objectivity of this work by the authors.

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T. Carter Gilmer is the founder and CEO of Michigan-Reading and Math (STEM) Performance—MI-RAMP—a community charity to uplift children ages 4-12. Before starting MI-RAMP in 2019, he was the director of AIMS (Academic Investment in Math and Science) at Bowling Green State University and an adjunct professor of Chemistry, retiring in June 2010. He received a BA in Chemistry from Drake University (1967) and a PhD in Analytical Chemistry from the University of Iowa (1971). He spent 20 years in the private sector with both Eastman Kodak Co. and DuPont Co., doing research on: a) advanced chromatographic techniques, b) dyes/couplers/developers in photographic systems, c) new catalyst systems for automotive enamels. Those efforts lead to six patents. Gilmer changed careers in 1990 joining the University of Michigan-Dearborn as an Associate Professor and the University of Michigan-Ann Arbor as an Adjunct Professor. His research involved synthesizing and characterizing interpenetrating polymer networks while teaching introductory, analytical and polymer chemistry.

Phyllis A. Russell-Gilmer, a native Detroiter, currently resides in Farmington Hills, Michigan. She holds a Bachelor of Science from the University of Detroit/Mercy College. Her degree in Human Resource Management allowed her to secure a career position within the automotive industry. Phyllis was a contributing writer to several publications within her work locations. Her poetry is also published in two volumes of the International Library of Poetry. Since retirement in 2005, Phyllis has given increased attention to her passion for writing. Phyllis' love for writing inspired her to author three children's books since her retirement. She is currently the administrative assistant to MI-RAMP and volunteered as one of the teachers-tutors for the first cohort of the distance-learning program.

Staci R. Newton is a certified Special Educator, Early Intervention Specialist and founder of the North Texas Angels Pageant nonprofit organization. This pageant was developed to connect people with disabilities to resources that improve their quality of life. As a special educator, Mrs. Newton has worked as a Director of Special Education and in several other capacities including Team Leader for the Special Education department and a classroom teacher. Newton received her bachelor's from Hampton University, and master's with a reading specialist certification from Bowling Green State University. Newton has dedicated her life to working with children and making sure society knows that ALL children can learn, regardless of their ability level or socioeconomic status. As a MI-RAMP board member, Mrs. Newton assists the organization by supporting the Teachers-Tutors in best practices to promote learning for the MI-RAMP Young Scholars.

Edward Broom, Jr. has served in the educational field for over 25 years in the Detroit and Ann Arbor public school districts. He currently is serving as intervention specialist and has served as a mathematical specialist, Middle and High school classroom teacher, Instructional Specialist, interim principal and assistant principal. He earned a Bachelor of Arts in Mathematics from Morehouse College, a master's in teaching and an Educational Specialist in Administration and Supervision degree from Wayne State University. In 1999 he received the Booker T. Washington Educator of the year award while teaching in the Detroit Public schools. He began his teaching career in Detroit as a classroom teacher working in various schools with the Project Seed, Inc. organization teaching Algebra in grades 4-6. Then he taught mathematics to 7-8 grade students for 10 years, as well as, to 9-12 graders in the Cranbrook/Kingswood Horizon Upward Bound summer program for 13 years. Broom evaluates state standardized tests, such as the MEAP and Terra Nova. Most recently, he has served as an interim and assistant principal of Scarlett middle, interim principal of Carpenter elementary and assistant principal of the Ann Arbor Science Technology Arts and Mathematics schools.

Appendix A:

Parent Questionnaire of MI-RAMP Virtual Programs

MI-RAMP Evaluation Survey Questionnaire

Dear Parents/ Caregiver of MI-RAMP Young Scholars,

We need your help! MI-RAMP is conducting a survey to determine the value of what we do for Young Scholars across the board.

Please return no later than TBD, to Ms. Staci Newton, pooh1tchr@gmail.com

Please Begin Here: _____

Cohort: 1 ■ (December 20, 2020 - March 24, 2021)

Cohort: 2 ■ (April 3, 2021 - June 26, 2021)

Cohort: 3 ■ (July 24, 2021 -Oct. 23, 2021)

Young Scholar's Age: _____ Gender: M ■ F ■

Teacher-Tutor: Dr. Carter Gilmer ■ Ms. Phyllis Gilmer ■

Ms. Ryan Swanson ■ Ms. Victoria Washington ■

Ms. Rhena Holmes ■

(Circle One for each statement)

4(Strongly Agree) 3(Agree) 2(Neutral) 1(Disagree) 0(Strongly Disagree)

1. TT helped improve my child's overall skill set	4	3	2	1	0
2. TT was knowledgeable about the subjects	4	3	2	1	0
3. TT's method of assistance was effective	4	3	2	1	0
4. The quality of tutoring met my child's needs	4	3	2	1	0
5. The sessions were available at times I needed	4	3	2	1	0
6. MI-RAMP staff was helpful in communicating and meeting my needs	4	3	2	1	0
7. I am satisfied with the assistance received from MI-RAMP	4	3	2	1	0
8. I would recommend MI-RAMP to other families	4	3	2	1	0
9. My child's reading improved	4	3	2	1	0
10. My child's mathematical skills improved	4	3	2	1	0

Comments: Use the space below to make comments

_____

_____

_____

_____

_____

Thank you for your time!