@ Scale Project:

Increasing Accessibility to Algebra & Geometry for ALL Students (IAAG)

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II. Goals and Objectives

While this program focuses on **Goal 2**, Increase Student Academic Achievement, and **Goal 3**, Increase of Skilled Educators, with a focus on mathematics for students in grades 5-10, IAAG also links to the other goals of the STEM Plan. The ability to do math is the gatekeeper for the rest of the STEM goals, especially student readiness for post-secondary STEM programs and post-secondary graduation rates and increasing STEM interest with the students. Math plays a critical role in students' readiness for both college and career. Many students are not placing high enough on entrance exams in college and have to repeat high school level math in college. This professional development experience is geared toward using instructional strategies designed to help close this achievement gap and have more students ready for college level math. When teachers understand and learn how to apply universal design strategies and techniques to their instructional practice, they become better equipped to increase accessibility of rigorous mathematics to a broad range of learners.

III. Implementation

Our @Scale project, IAAG was run this summer, July 7 – 9 and 13 – 16 at Nashoba Regional High School in Bolton. The program was advertised via email to Massachusetts teachers and school district administrators. We reached full registration capacity of 25 teachers with 15 teachers on the waiting list within one week of sending one informational email. One teacher ended up withdrawing at the last minute due to personal issues, so we had an enrollment of 24 teachers for the course.

IV. Scale

The majority of educators involved in this professional development program are either from high needs districts, or are teachers of students with disabilities, or teachers teaching out-of-field, or teachers of English language learners, or teachers without an appropriate license or teachers teaching on a waiver. High needs schools, as defined by the MA Department of Elementary and Secondary Education (DESE), have low scores on MCAS and usually serve high underserved populations. The location for this course is at Nashoba Regional High School, which is centrally located between Rtes 495, Rte 2 and Rte 190, nearby to such high-needs school districts as Fitchburg and Leominster.

The goal of the program is to introduce the use of multiple representations—numerical, graphical, symbolic, and verbal—for problem solving in order to encourage all students to increase their mathematics conceptual understanding and math skills abilities. In order for this to occur, the teachers need to be proficient in both content and pedagogy. To assess the content gain of the teachers, there is a content pretest and posttest, based on the Mathematics Frameworks and the MCAS for these grades (Appendix B). The goal of the pre and post test is to document the content increase of the participants.

All participants are expected to contribute in content, instruction, and assessment activities during the institute as modeled by the instructors. Teachers will reflect on the mathematics content and the instructional strategies presented during the program both orally and in writing. This allows the professional development providers to monitor the teachers' growth in understanding and identify areas that need additional support. During the program, participants will be assigned readings for homework taken from the provided resources. Small group discussions will be held so that teachers will be able to share their thoughts about the content of the articles. Participants will plan, create and implement a unit during the first term of the school year that follows the summer institute to demonstrate their ability to use multiple representations and instructional strategies modeled during the institute in the mathematics classroom. Teachers may work independently, as part of a school team that supports common students, or as teams of teachers who teach the same grades/courses whether in the same or different schools to develop and implement the unit. The units will demonstrate whether the participants were able to integrate the idea of multiple representations and other IAAG strategies effectively into their lesson plans and ultimately into their classrooms to increase student achievement.

If additional @scale funding were to be available, additional cohorts could be held in other high needs locations in Massachusetts. An additional institute is being held in August for the Waltham Public School district. Their assistant superintendent used to be an instructor for IAAG and knew the value of the course so they are paying to hold their own shortened institute for Waltham school teachers again this summer. We have many requests to provide this course – funding is always difficult for schools to obtain, and it would most likely be much harder for teachers to participate if their registration fee was not waived.

V. Outputs, Outcomes & Evaluation

This course was a success, as evidenced in gains from the posttest scores (see data listed below):

	Participant Code	**Pretest Score (35 TOTAL PTS)**	**Posttest Score (35 TOTAL PTS)**	**Percent Gain**
1	AA	18	25	20%
2	JK	15	24	26%
3	LC	26	33	20%
4	HG	28	35	20%
5	AC	28	35	20%

6	BD	29	33	11%
7	AE	27	31	11%
8	NH	28	32	11%
9	MH	29	29	0%
10	KH	28	35	20%
11	PK	17	25	23%
12	DK	17	21	11%
13	JL	25	32	20%
14	ML	17	30	37%
15	AL	21	24	9%
16	MM	13	23	29%
17	MMO	26	30	11%
18	GO	29	33	11%
19	BP	15	29	40%
20	IP	10	26	46%
21	LS	21	27	17%
22	SR	18	28	29%
23	MW	18	34	46%
24	RW	24	24	0%

Aside from two participants who maintained their pretest score in the posttest, all participants increased their score from at least 9% to as much as 46%!

Data from the End-of-Course Evaluation Form is as follows:

Statement	**Average Rating (out of 4)**
Goals and instructional objectives as outlined in the syllabus were addressed during the course.	4
The facilitators had a strong command of the subject matter.	4
Activities and materials were presented in an organized manner.	4
I felt that the facility for this course was appropriate.	3.9

Teacher participant comments were extremely positive and included such sentiments as:

- "The idea that is most interesting to me is that most, if not all, concepts can be addressed via multiple representations and provide multiple entry points for students."
- "Not much could be done to make this course better meet my needs – this was great for me as a career-changer. This workshop was something I wish I had attended when I first began teaching."
- "Multiple representations are powerful in learning and how easy it can be to embed different strategies for representations. I see using these strategies on a nearly daily basis."
- "I can use (and I plan to) use every strategy we learned in my classroom in some way or another. This class has given me numerous resources to use in my room."
- "This course was wonderful and I cannot think of how to make it better other than the days were long. Although they were long, the tasks were well broken up and interesting. I enjoyed each day."
- "All my needs were met in this course – so many doors were opened, and now it's my turn to explore."
- "All facilitators modeled good teaching. The class was very enjoyable and engaging and I learned a lot. I appreciate how organized you all were and loved having four different presenters. Great class! Thank you."
- "I loved the idea of an open question which is inherently differentiated, and I also love expanding the traditional Rule of 4 to possibly include more representations."

At the Fall Follow-up, held in October 17, teachers shared how they have incorporated the instructional tools modeled during the summer portion of the course into their own classroom practice. Teachers completed a unit project whereby they implemented at least 4 course-modeled instructional strategies that they created into a unit of study of their choosing. During the follow-up session, teachers shared one of these strategies and then gave insights about how the unit of study was taught, including reflection on changes in student learning as a result of implementation of the strategies. Some of these projects included:

Project Title	**Grade Level**	**Course-Modeled Strategies Implemented**
Multiplying and Dividing Decimals	Grade 6	• Parallel Task • Row by Row • Link Sheet

		• Concept Splash
The Real Number System	Grade 7	• Foldable • Sort • Learning Stations • Concept Splash
Elements of Geometry	HS Geometry	• Web • Vocabulary Matching • Row by Row • Always-Sometimes-Never

VI. Budget and Plans for Program Sustainability

The funding received was used to run a course for 24 teachers throughout MA. This project has been offered since 2001 and has plans to be continued each year as a PD institute either via DSAC courses, through the DESE or from school districts willing to pay for this institute. If additional funding was available, the instructors would expand on this course to develop a new course following the same guidelines but address additional topics in algebra and geometry. Each year teachers try to sign up again for the same course because they have loved the information learned the previous year.

Form 1a: Expenditure Worksheet

Please complete the expenditure worksheet below. In the first column, identify how you divided your grant among the identified expense categories. In the second column, list your expenditures to date. The third column will automatically populate with the difference (remaining balance). Make sure to sign and date this worksheet before submission and include any necessary explanations or comments in the "Comments Box".

Instructions: Double-Click on the table for it to become an interactive spreadsheet. Click outside the table to return to MS Word. ONLY FILL IN CELLS HIGHLIGHTED IN YELLOW: Non-Yellow cells contain formulas and will fill in automatically. Also, all cells are formatted for currency; you do not need to type in $ signs.

Fringe Benefits	$ 1,730	$ 1,730	$ -
Contractual Services	$ 14,000	$ 14,000	$ -
Travel/Transporation	$ 1,500	$ 1,500	$ -
Total Supplies & Materials:	$ 5,500	$ 5,500	$ -
Curriculum			$ -
Equipment	$ 3,000	$ 3,000	$ -
Other	$ 2,500	$ 2,500	$ -
Training			$ -
Tuition & Stipends			$ -
Evaluation	$ 2,000	$ 2,000	$ -
Other (Identify)			$ -
Other (Identify)			$ -
Indirect Costs (10% Max)	$ 3,050	$ 3,050	$ -
Total	**$ 33,549**	**$ 33,549**	**$ -**

Project Name/Organization: IAAG Course_____

Project Manager: **Karin Lebeau** **Date:** **1/25/16**

Comments Box

All monies were spent towards the course for instructors, supplies and evaluation.