Using Mathletics to Support Mathematics Instruction

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Settings and Context

The capstone project setting will be Brumby Elementary School, located in Marietta, Georgia. Brumby Elementary is a Pre-K through 5th grade elementary school in the Cobb County School District. The school is located in a suburban area and is a Title I school with approximately 935 students. As of August 22, 2018, Brumby has 70 white/Caucasian students, 45 multiracial students, 223 Hispanic students, 549 black students, 45 Asian/Pacific Islander students. Approximately 71% of the students are economically disadvantaged and have qualified for free and reduced lunch. There have been 105 students identified as Students with Disabilities and 105 students identified as English Language Learners (ELL). Brumby also has 17 gifted students (some students have not been put in the system) and 25 EIP students (correct numbers are not yet in the system). Brumby's administration consists of one principal, two assistant principals, one SLP, one academic coach and one technology coach. There are three counselors, approximately 50 classroom teachers, 15 paraprofessionals, one read 180 teacher, 10 special education teachers, one gifted teacher, 19 core expansion teachers, 11 student support teachers, five ESOL/ELL teachers and one nurse. In 2016 Brumby received its Cobb County STEM Certification and in 2017 they received their Advanced Ed STEM Certification.

Historically, Brumby has been located in an affluent East Cobb neighborhood with a small percentage of neighborhood students attending. The majority of the student population served comes from apartment complexes in the Brumby district. According to the College and Career Ready Performance Index (CCRPI) multiracial students Subgroup met Participation Rate, State Performance Target and Subgroup Performance Target. Black students Subgroup met

Participation Rate and Subgroup Performance Target but not State Performance Target. Both of these were in English Language Arts; the other five subgroups met the Participation Rate, but did not meet either the State or Subgroup Targets in English Language Arts. All seven subgroups met the Participation Rate, but did not meet either the State or Subgroup Performance Targets in math, science or social studies (Georgia Department Of Education, 2017).

Brumby was recently rebuilt for the 2018-2019 school year and this is their first year in the new school. The School Improvement Plan (SIP) has identified that students at Brumby are underperforming in math. The SIP identified a lack of basic number sense as the root cause of student math weakness. The SIP goal is to increase the number of students from non-proficient to proficient by 3% by the end of the school year. There are several initiatives for teachers and students. The first initiative is to provide math extension and remediation in the core extension rotation. The second initiative is for teachers to use math software to support instruction and use data to monitor student standard progress.

With all of these initiatives Brumby continues to struggle with student achievement in math. The administration has decided that a teacher will be responsible for monitoring researching, implementing and monitoring a math software program. Many teachers request math software programs and then do not implement them in their classrooms. The usage data for the multiple programs last year was extremely low. Thus, the goal is to have one math software program with one teacher responsible for training and implement throughout the school. This teacher will monitor usage and encourage students and teachers to use the program and provide support and incentives for using the program. The program of choice this year is Mathletics. This program has grade level Common Core Standards that can be practiced, reviewed and assessed. The program also allows teachers to individualize learning by remediating or extending

knowledge. Mathletics has a live play component that evaluates students' number sense and creates number sense practice on an individual's level.

Statement of Problem, Need and Rationale

The problem that prompted this project proposal is Brumby's low preforming math scores by every subgroup documented in Georgia College and Career Ready Performance Index (CCRPI). Brumby's School Improvement Plan (SIP) states the core problem for low math scores is "students do not have a strong foundation in number sense and students do not have a strong foundation in place value (Georgia Department of Education, 2018)."

Number sense begins in kindergarten and place value in first grade so why are students at Brumby not retaining this information? There are a couple of major factors. One, the majority of students at Brumby enter kindergarten without having any prior early childhood education. We know that education starts well before kindergarten, research shows that early learning birth through five is critical to developing education and social skills. Mongeau (2013) states, "a study showing that early math skills are one of the best predictors of later success in both math and literacy has become a cornerstone of the growing movement among early childhood educators to boost math instruction in preschool through 3rd grade (Mongeau, 2013). How do preschoolers first learn math "by exploring their world (Stanberry, 2018)." Many students at Brumby did not have an opportunity to explore their world in a preschool setting. These students enter their first year of school already behind, not just compared to peers who have attended an early childhood program, but behind according to the expectations/prerequisites upon entering kindergarten. This makes it difficult for students to gain a foundation in number sense at a kindergarten level when they come in with toddler knowledge. As those students progress though the grade levels the lack of foundation is exposed and the gaps are compounded.

The second factor is poverty. Brumby is a Title I school with 71% of the population receiving free or reduced lunch. According to Mathewson, “when a person lives in poverty, a growing body of research suggests the limbic system is constantly sending fear and stress messages to prefrontal cortex (Mathewson, 2017). Which overloads its ability to solve problems, set goals, and complete tasks in the most efficient ways (Thomas, 2016).” So the students at Brumby have not had a preschool foundation and they are living in poverty which limits their ability to solve problems this is a key component in math. Studies are now showing how poverty actually changes the brain. “A delay in the growth of the area of the brain that regulates problem solving, attention and judgment accounted for 16 percent achievement gap for high schoolers living below the federal poverty line. Likewise, a delay in growth of the area of the brain that monitors memory, emotion and language accounted for a 21 percent difference in academic achievement (Thomas, 2016).”

There have been many initiatives to try and combat this ongoing problem. Six years ago Brumby was on a “needs to improve” list. The Bobcat Club was started and funded by Title I. The club was an afterschool tutoring club that implemented a web based program that individualized learning to meet the need of each student. Students were provided a snack and bus transportation home. The program ran for two years and math scores were raised bumping Brumby off the “needs to improve” list, therefore the program was dropped. After dropping the program, scores began falling again. Now tutors come in and out of the building throughout the day pulling students in need of extra support. Teachers also tutor students before and after. Still, with all this support Brumby is unable to get a handle on the number of students that need support in math. The math tutors are focusing on grade level standards even though they notice students are lacking number sense and place value concepts that were taught in earlier years.

Working in the core expansion rotation as a math teacher I see all students' kindergarten through fifth grade. I have noticed that most classes are a grade level or two behind. I have used a variety of strategies when teaching math standards to a class. What seems to work best is to go teach a standard whole group and then use technology to practice that standard. I have relied on technology heavily because I feel it allows students to work on their level at their own pace. I am able to let students that know how to do the standard show that they know it, and possibly help others that kind of have it but need some support. Then I am able to work with those that do not get the concept at all. I know that the students that grasp the concepts will usually be the same students in each class. I often offer those students challenges so I have teaching time with them as well.

Teachers at Brumby also use instructional websites to support the math curriculum. However, thousands of dollars have been spent on these sites in the past few years and the usage is usually very low. Teachers are struggling to find time to learn the web based programs in order to implement them in a meaningful way. A report from "the Alliance for Excellent Education and the Stanford Center for Opportunity Policy in Education (SCOPE) finds that technology-when implemented properly-can produce significant gains in student achievement and boost engagement, particularly among students most at risk (Education, 2014)." Thus, using technology can improve learning and help close the achievement gaps (Education, 2014)." Instead of several teachers choosing expensive sites they will uses occasionally, I have researched and tested Mathletics. We will use school wide and I will be responsible for learning the program and then coaching teachers on how to use the program and ways to implement the program in their classrooms. I will provide teachers with PL opportunities as well as individual training if needed. A representative from Mathletics will come in to answer any questions and to

get teachers excited about using the program. Mathletics is aligned to Common Core math standards which will give students grade level math practice as well as opportunities to work on number sense and place value. The Appalachia Regional Comprehensive Center explains the "keys to the successful implementation of technology for student leaning" and at the top of the list is to "provide effective professional development for teachers on the instructional integrations of technology (Appalachia Regional Comprehensive Center). Giving teachers technology support, guidance and assistance in using Mathletics will allow students to work at their individual levels to help decrease the gaps in number sense and place value.

Objectives and Deliverables

My overall goal is to support teachers in using Mathletics as a technology tool that will reinforce math standards. The Mathletics program will assess students on their grade level knowledge of standards and allow them to work below, on, or above level. Thus, individualizing student learning to meet the needs of all students. Having students work on their level will ideally help close the learning gap in math specifically number sense awareness and place value foundation. The following objectives and deliverables will be the basis for my project and will be achieved by the end of the school year (May 2019):

Project Objective: By October 31, 2018, I will have provide teachers the opportunity to learn how to use the Mathletics program giving them the confidence they need to use the program independently in their classrooms. Teacher usage will increase by 25%.

Deliverables:

1. Create a survey addressing teacher awareness of the Mathletics program.
2. Gather questions to be answered to create a meaningful professional development workshop on how to use the Mathletics program.

3. Teachers will provide feedback on the likeliness to use the program in their classrooms.

Project Objective: By November 16, 2018 I will put in place student incentive plan and class incentive plan for using the Mathletics program. Increase class usage by 40%.

Deliverables:

1. Make weekly announcements on the Friday live Brumby news announcing the top three students using Mathletics and the top three classes using Mathletics.
2. Provide students with certificates at bronze, silver and gold levels and display certificates outside of the math lab.
3. Create a Mathletics class of the month poster/certificate/trophy to be displayed outside of the classroom to promote Mathletics use school wide.

Projective Objective: By December 14, 2018 all students 1st-5th grade will have taken a pre and post number sense assessment on Mathletics and I will provide teachers with a workshop on how to access the data and how to cater Mathletics program to individual student needs using the data. The goal for this objective is to have 90% of Brumby teachers utilizing the Mathletics program.

Deliverables:

1. Give student assessments pre and post.
2. Show teachers how to access class data and compare pre and post scores.
3. Instruct teachers how to use data to individualize Mathletics program to meet the needs of each student.

PSC Standards

My goals and objectives are supported by the Georgia Professional Standards Commission with a heavy emphasis in standard number two. Standard two focuses on working

collaboratively to plan and assist other teachers with the use of technology to improve teaching, learning and assessment (Georgia Professional Standards Commission, 2018). This project provides teachers with tools to improve teaching and learning with the assistance of technology while focusing on differentiation with direct support throughout the school year.

- 2.5 **Differentiation** Candidates model and facilitate the design and implementation of technology-enhanced learning experiences making appropriate use of differentiation, including adjusting content, process, product and learning environment based upon analysis of learner characteristics, including readiness levels, interests, and personal goals.
- 2.7 **Assessment** Candidates model and facilitate the effective use of diagnostic, formative, and summative assessments to measure student learning and technology literacy, including the use of digital assessment tools and resources.
- 2.8 **Data Analysis**

  Candidates model and facilitate the effective use of digital tools and resources to systematically collect and analyze student achievement data, interpret results, communicate findings and implement appropriate interventions to improve instructional practice and maximize student learning

Project Description

This project was designed with the knowledge that students at Brumby are struggling to meet grade level standards in math. Teachers often request supplemental math programs and then do not utilize these programs due to knowledge of how to use the program and the features the program has to support student learning of grade level standards. The objectives provide teachers with the direct instruction and professional learning they are seeking within a specific program.

The deliverables will hold support staff and teachers accountable for understanding the program and using the program effectively to increase student knowledge while addressing PSC standards.

First project activity.

The first project activity will be evaluated October 31, 2018. The goal is to increase teacher usage of the program by 25%. I will begin the process by creating a needs assessment. After careful review of the needs assessment I will provide a professional development training to allow teachers to learn how to manipulate the program and how to use the program to differentiate learning to meet the needs of all students.

Second project activity.

The second project activity will be evaluated on November 16, 2018 I will put in place student incentive plan and class incentive plan for using the Mathletics program. Increase class usage by 40%. To achieve this goal I will monitor the Mathletics performance and awards earned by students and track class usage weekly. I will then develop a system to implement an incentive program for students and teachers.

Third project activity.

The third project activity will be evaluated on By December 14, 2018 all students 1^{st}-5^{th} grade will have taken a pre and post number sense assessment on Mathletics and I will provide teachers with a workshop on how to access the data and how to cater Mathletics program to individual student needs using the data with the goal of 90% of classroom teachers using the Mathletics program.

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