

Using STEAM to Improve Student Achievement

Capstone Report Part B

Amy Calley

Kennesaw State University

Education Specialist in Instructional Technology

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Brumby Elementary is a Title 1 public school in Marietta, Georgia, with a population of roughly 946 students. The school is Cobb County STEM certified, as well as Advanced Ed STEM certified, and continues to use the engineering process/design process to encourage creativity and student success, as Brumby Elementary moves towards STEAM certification. Brumby's School Improvement Plan (SIP) lists remediation and acceleration in mathematics and reading as overarching needs. Its goals are to increase the percentage of students proficient in math and reading by 3% (Georgia Department of Education, 2018). In an effort to improve academic scores, a specials rotation called Core Extension (Core X) has been implemented. This rotation allows students to receive expanded instruction in academic and non-academic areas, but with a teacher other than their homeroom teacher in a different setting. Within this rotation, students receive visual arts, music, writing, cultural connections, career, physical education, counseling, social studies, theatre, math, and science instruction.

In support of STEAM initiatives, Cobb County offers an Advanced STEAM cohort as part of the STEM Innovation Academy. The Science/STEM HYPE (Helping Young People Excel) Team members are participants in this program. This cohort offers professional development for educators as they are required to complete a Weebly portfolio documenting their classroom implementation, as well as how they are sharing their knowledge with other educators on their campus and beyond. The sessions allow for STEAM development of teachers across grade levels and subject areas that support student achievement within each school's individual setting. Further implementation of STEM/STEAM activities within individual classrooms and schoolwide can make a positive impact on proficiency in reading and math.

### **Description of Capstone Experience**

The problem this Capstone project sought to address was using technology and the arts as part of STEAM to improve math and reading proficiency. STEAM (Science, Technology, Engineering, Art, and Mathematics education), according to Kofac (2017) can be defined as “education for increasing students’ interest and understanding in scientific technology and for growing STEAM literacy based on scientific technology and the ability to solve problems in the real world” (as cited in Bogner, 2018, p.154). Part of the issue can also be explained by self-efficacy – what students believe about their own academic performance. When students see themselves as low-performing, their efforts can reflect that. A noted benefit for the inclusion of the arts in a STEM classroom, as proposed by Becker and Park in 2011, is the potential increase of student motivation, achievement, and engagement (as cited in Gess, 2017). Not only can STEAM help incorporate math and reading through the arts and technology, but it also serves to help students feel successful by their own standards. STEAM aligns the creative process with the engineering design process in that it gives students opportunities to apply standards-based content in authentic, meaningful ways (Nagel, 2018). This supports the Capstone project goal in instructing grade level teachers as to how to incorporate the visual arts into STEM through digital journaling, as the blended model increases student achievement across grade levels and subject areas. STEAM education uses the arts to enable students in achieving levels of proficiency above and beyond core knowledge and skills (Gess, 2017).

The goal of this capstone proposal was to support teachers in incorporating STEAM into their lessons through art and technology for the purpose of impacting student achievement. Teachers were to learn how to use and document STEAM strategies through digital journaling to effectively help students improve their overall understanding of grade level standards in math,

reading, science, and art, and thus their performance in those areas. As the school has moved towards personalized learning and from STEM to STEAM, this presented an opportunity to use technology for instruction and assessment. The purpose of this project was to encourage teachers to incorporate STEAM strategies involving use of online journals utilizing Office 365/OneNote digital portfolios. Evaluation was to take place at the completion of the workshop and through classroom observations of the digital portfolios put into use.

To meet project objective #1 (creating digital journals within OneNote), the first project activities included designing and implementing a workshop, creating and distributing handouts, and creating a video/screencast. The workshop served to instruct the members of the HYPE Team in creating digital journals within the OneNote platform, and conducting a similar training with their respective teams. The handouts describing the process of portfolio implementation were distributed during the workshop, and the video demonstrating implementation within the classroom setting was developed post-workshop. These activities were intended to meet the objective of 80% of members of the HYPE team understanding digital portfolio implementation.

To meet project objective #2 (continued implementation), the second project activities included access to resources, creation of a calendar for one-on-one support, and recordings of observations available through an online platform, also within OneNote. The resources included the previously mentioned handouts with extended explanations, links to Microsoft sites supporting use of digital journals, and videos depicting implementation by teachers at Brumby Elementary across grade levels and subject areas. The calendar of availability was developed to give teachers access to classroom visits, where they could request a visit to assist in implementation, or they could request to observe a colleague's implementation. Observation of classroom implementation served to evaluate the effectiveness of the workshop, handouts,

videos, and calendar for one-on-one support, as well as overall implementation of digital portfolios.

### **Implementation**

Implementation of the Capstone project was successful, yet it varied from the intended proposal. By working with HYPE Team members as a requirement of the Advanced STEAM cohort, I was able to instruct colleagues in how to use technology and art in their classrooms to support reading and math, with the goal of creating an impact on test scores in those areas. The type of technology that was implemented included use of digital portfolios within OneNote, to be used as STEM/STEAM journals. The trainings, which were held in November and December of 2018, involved videos, individual and group instruction, and modeling of digital journals in use. As a member of the STEM to STEAM HYPE team at Brumby Elementary , the trainings were organized through team meetings, as the team consists of grade level teachers K-5, as well as Core X teachers who support grade level goals. Teachers were then expected to train their corresponding teams as to how to implement digital portfolios for STEAM integration. Although the initial workshop in November was attended by all twelve HYPE Team members from varying grade levels and subject areas, participation as far as follow-up was not as consistent. This was partly due to time constraints, but also due to ongoing responsibilities of the HYPE team, and other trainings that arose during the school year.

Revisiting the workshop components, including structure, handouts, and success of implementation within the classroom, did not occur during December as planned, but follow-up with HYPE team members began in January of 2019. With December being a busy month between holidays, the HYPE team did meet to plan STEM/STEAM Showcase days that occurred

during the following months, but there was not time for discussion and reflection of the workshop components. Also, Brumby Elementary began Microsoft Innovative Educator (MIE) certification late fall, a process that I was unaware would take place when designing the Capstone project. On one hand, the components of this certification were beneficial to teachers and staff as far as understanding Office 365, OneDrive, OneNote, and Class Notebooks, but the time commitment for the workshops and homework modules was unprecedented, and the requirements created repetitiveness that undermined the goal of the Capstone workshop as far as the train-the-trainer model. Teachers were exposed to digital journals within OneNote during one of the MIE workshops, and an assignment involved creating a Class Notebook, including the digital portfolio aspect. This occurred after the training with the HYPE Team, so members were not as eager to revisit the workshop or be involved in training their grade level teams.

This also factored into participation in the videos of classroom implementation. The intention was for HYPE team members to train their teams, and for teachers from each grade level to be observed, recorded, and used as part of the digital learning platform. Due to time constraints of the HYPE Team as far as MIE certification participation and planning of upcoming STEM/STEAM Showcase days, training their teams did not occur, with only the training of the Core Extension team. Therefore, I relied on my team members in creation of the videos in their classrooms, which did not fulfill the goal of having examples from all grade levels.

### **Project Outcomes**

The first project objective was for 80% of the HYPE Team to become proficient in creation of a digital portfolio within OneNote, delivered through the initial workshop,

availability of handouts, and videos of classroom implementation for reference. Due to time limitations of HYPE Team availability, as well as teachers being trained in OneNote and Class Notebooks through MIE workshops, I was unable to revisit the training workshop with the HYPE team, nor observe members conducting lessons implementing digital journals in their classrooms. All HYPE Team members did participate, but proficiency would have been measured by observation/recording of team members instructing their corresponding grade level, which did not occur. Although I was unable to observe HYPE Team members conducting workshops, I was able to conduct a workshop with the Core X team, and record implementation in several classrooms.

The second project objective focused on building the structure of the online learning platform so that tutorial materials could be easily loaded and made available once created. A screencast tutorial was created that shared the logistics of using digital tools to create the teacher accounts, enrolling students, and navigating the dashboard. The handouts and how-to documents were uploaded to the platform, and one external resource was created by Microsoft was linked, as well as the schedule for supporting teachers one-on-one. Further Microsoft links were not added due to repetitiveness with handouts I created, and informative links being difficult to navigate, nor were videos of classroom implementation by members of the HYPE team. I was able to rely on the Core X team members that I trained to implement digital journals within at least one grade level, and I was able to use those videos as part of my online learning platform.

### **Barriers Encountered**

The biggest barriers I encountered were time constraints and repetitive training due to the Microsoft Innovative Educator (MIE) certification. Time and availability issues also arose due to

the HYPE Team having STEM/STEAM Showcase days to plan for and implement during December, January, and February, as well as MIE trainings occurring during teachers' planning times. The MIE workshops included training on digital journals within OneNote as part of Office 365, so even though it was not to the extent that the training entailed, teachers felt that they had training on the same information and that their planning time had already been well spent. The HYPE team members wanted to continue contributing, but they were also participating in the MIE certification workshops, as well as previously schedule duties related to the STEM/STEAM Showcase days, and they could not devote time and energy that was unavailable due to these circumstances.

### **Follow-Up**

Due to the project objectives that were met and activities that were implemented, there is a solid foundation for extended trainings and follow-up. Although the MIE workshops presented a problem as far as contributing to time restraints for the HYPE team members and teachers, as well as providing training that was repetitive to the Capstone project, it did provide a basis to expand upon in the coming school year. Also, the MIE certification provided continuing education as far as how a workshop could be implemented with an entire staff by grade level, instead of using the train-the-trainer model for grade level trainings. The digital resources and online platform will also serve new staff in the coming years if they have not been MIE certified, or if they desire to incorporate digital journals with a new grade level or subject matter. As Brumby Elementary is continuing to move from STEM to STEAM, use of digital journals within OneNote will continue to be of importance in documenting and sharing learning goals and supporting activities within reading, math, the arts, and beyond.



### **Discussion and Reflection**

From completing this capstone, I learned that being a leader in technology facilitation involves more than knowing how to effectively implement technology in a classroom, grade level, or subject area. It involves understanding the audience of educators, recognizing their needs, and communicating with administration about the best ways to support school-wide technology initiatives. Introducing a new technology resource to colleagues requires not only knowledge of the instructional tool itself, but also the best ways to use the tool to support student engagement and achievement. This capstone experience expanded my understanding of teaching, learning, and assessment, digital learning environments, professional learning and program evaluation, and professional growth and development.

The goal of instructing grade level teachers as to how to incorporate visual arts into STEM through use of digital journals developed knowledge and skills pertaining to the approach, design process, and learning environment. When designing the experience, I was initially unaware that the entire school would be receiving similar training as part of M.I.E certification. One difference that I was able to provide was in using aspects of OneNote to present the actual training to the HYPE team members, as well as to design the digital platform to support classroom implementation by individual teachers and grade levels. I learned that facilitating the experience for teachers through the same technology resource that was being implemented for students provided a more authentic, engaging experience (Gess, 2017).

### **PSC Standards**

The first standard addressed in this capstone was Standard 2.3 – Authentic Learning. The main goal of the proposal was to implement a workshop for teachers on digital notebooks within

OneNote, so that the notebooks could be implemented within STEAM lessons in the classroom. The standard of authentic learning was applied in this project as the use of digital journals within STEAM involves recording observations and implications, as well as self-assessment, based upon participation in lessons that involve real-world problem solving. An additional standard that is served by the same purpose is 2.4, Higher Order Thinking Skills. This standard involves use of digital tools and resources to support these skills, which is involved both in my presentation of the workshop, as well as teacher implementation of the digital journals. Standard 3.3, Online and Blended Learning, was also involved in both workshop facilitation and teacher facilitation with students, as digital journals (online learning) was used to record and reflect upon STEAM learning (non-digital), which expands opportunities and choices for students and educators.

### **Recommendations**

For a person choosing to conduct a workshop on digital resources, I would highly recommend confirming with administration, as well as instructional technology coaches, as to what technology implementations may be on the horizon. It is not safe to assume that just because a technology implementation has not been announced or occurred at the beginning of the year, means that it will not arise later in the year. The goal of this is to ensure that trainings will not overlap, causing one to be ineffective, although if coordinated, one could benefit the other. Another recommendation would be to design the entire learning experience for a workshop with the digital platform being taught, so that it further exposes educators to digital tools and resources that they can experience and not just explore. As a technology coach, one should not just devise a schedule for classroom observations, but also require that teachers choose a time frame as opposed to date/time, and possibly call these “interactions”. Many teachers, even those

who have specific needs, will not choose a time because of changing schedules and subject matter. By allowing teachers to choose a frame of time, they can then narrow it down closer to time, or change the time frame if need be. This allows teachers to comfortably explore the digital tool being presented, without feeling pressured to fit it in to a specific lesson. This also enables the instructional technology coach to provide more suggestions for use, as the coach could visit multiple times within the time frame.

### References

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