Examining the Flipped Classroom Model through Literacy and Math Integration: Lessons Learned from a Teacher Quality Professional Development Grant Initiative

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PURPOSES

One approach to developing students' academic resilience is to provide meaningful opportunities for them to actively participate in the learning process (NEA, 2007). With a mission of creating a new paradigm of instructional methods to increase engagement in student learning in order to develop more resilient students in a high-needs school, this study embarked on implementation of the flipped classroom model in an elementary education setting while executing a Teacher Quality State Grant Professional Development Initiative in a Georgia public school system. Teachers often have difficulties managing their limited classroom time and the number of face-to-face classroom meetings to achieve an effective balance between lectures and active learning strategies. Flipped classroom models have addressed these challenges by allocating more class time for active learning approaches and by increasing accessibility to advanced technologies to support a blended learning approach (Bergmann, Overmyer, & Wilie, 2012; Davies et al., 2013).

This presentation will discuss an initiative designed to equip primary and elementary grade educators with information and research-based practices to facilitate development of teachers' repertoire of writing instructional strategies and deepen their math content knowledge through a flipped classroom model. The primary goal of this project is to train teachers from one of Georgia's Public School Systems to more effectively engage primary (Kindergarten-Grade 2) and elementary (Grades 3-5) students in the flipped classroom model through Common Core Georgia Performance Standards (CCGPS) in math, writing, reading, and metacognitive learning strategy instruction during the summer of 2014. Ongoing professional development and follow-up visits throughout the 2014-2015 academic year will ensure that teachers are continuously supported as they implement content gleaned through the workshops.

The flipped classroom model will address the need to increase the math achievement of all students by providing differentiated and supplemental instruction in a self-paced learning environment. Writing achievement and literacy needs will also be addressed. Writing to learn—in mathematics, science, social studies, and the arts—is an important consideration for elementary school teachers. Writing can serve as a valuable performance assessment tool for teachers to check mathematical content-area understanding. Teachers' expanded lessons, stronger content knowledge, and expanded technological skill will directly improve instruction and ultimately student learning**.**

The presentation will define and describe the Flipped Learning model, briefly note its historical foundations, and address common misconceptions. We discuss learning theories that underlie the model and describe current empirical research findings. We also describe concerns that have been raised while we developed the flipped learning model. Research on the process of "mathematizing" literature will be integrated, as well as instruction on writing to learn in mathematics. This initiative meets the school districts' needs in terms of providing professional development to enable teachers to improve students' achievement in literacy and mathematics while integrating the digital learning trends of the twenty first century student.

THEORETICAL FRAMEWORK

Flipped Classroom

Quantitative and rigorous qualitative research on Flipped Learning is limited; however, there is an established body of research that supports the key elements of the model. These are built on various instructional foundations to shift from a teacher-centered to a student-centered approach to instruction. A key feature of the Flipped Learning model is the opportunity to maximize student-learning opportunities in the classroom by deliberately shifting direct instruction to outside of the group learning space. The emphasis on maximizing one-on-one interactions returns the focus to student-centered instruction that more actively involves students in the learning process. These approaches are commonly said to involve "active learning," defined as "the process of having students engage in some activity that forces them to reflect upon ideas" (Michael, 2006).

In 2007, two rural Colorado chemistry teachers who were concerned that students frequently missed end-of-day classes to travel to other schools for competitions, games or other events began to use live video recordings and screencasting software to record lectures, demonstrations, and slide presentations with annotations. Bergmann and Sams (2012) are regarded as the pioneers of Flipped Learning. After they utilized this model to flip their classroom,

the teachers found that students began interacting more in class. Moreover, because time could be used more flexibly, students who were behind received more individual attention while advanced students continued to progress (Bergmann & Sams, 2012). Fulton (2012) also reported similar findings. After flipping their math classrooms, it was found that student engagement increased; simultaneously, students began exceeding academic expectations.

Writing in Math

Writing cannot be limited to the writing block if students are to succeed. Writing to learn—in mathematics, science, social studies, and the arts—is an important consideration for elementary school teachers (Knipper & Duggan, 2006). Writing can serve as a valuable performance assessment tool for teachers to check mathematical content-area understanding.

Utilizing literature to connect mathematical concepts helps foster understanding and motivates students to learn (Blintz, Moore, Wright, & Dempsey, 2011; Shatzer, 2008). The process of "mathematizing" aligns with the Common Core Standards (CCSS; National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). Instruction in "mathematizing" literature was integrated throughout the workshop plan and teachers were provided with opportunities to practice the method. This refers to "weaving together read-alouds, mathematics, and discussion to deepen student learning" (Hintz & Smith, 2013, p. 103) in order to provide teachers with a range of literacy tools to expand their students' mathematical repertoire. "Mathematizing" refers to a process of constructing meaning through a mathematical lens. This process enables teachers to provide students with opportunities to explore ideas, discuss mathematical concepts, and generate text-to-self connections. Utilizing literature to connect mathematical concepts helps foster understanding and motivates students to learn.

TPACK (Technological Pedagogical Content Knowledge)

The initiative emphasizes the connection among technologies, curriculum content, and specific pedagogical approaches, demonstrating how teachers' understandings of technology, pedagogy, and content (TPACK) can interact with one another to produce effective discipline-based teaching with educational technologies (Harris, Mishra, & Koehler, 2009). Douglas Reeves (2010) noted that there are "four imperatives for effective professional learning that are related to student results: teaching, curriculum, assessment, and leadership. It is nearly impossible to overstate the value of focus" (p. 4). Of central importance is that "research suggests that the most salient variable

in improving student achievement is not the brand name of the program but the degree of implementation of the program. In brief, it is practices and people, not programs, which make the difference for student achievement" (p. 3).

The project was designed to achieve the following objectives:

1. to improve teachers' depth of math, literacy, and instructional technology content knowledge;
2. to teach the flipped classroom model through an integrated math and literacy approach while "mathematizing" read-aloud instruction;
3. to expand teachers' repertoire of appropriate and effective instructional, blended technology tools for teaching math; and
4. to develop pedagogical models of differentiated, personalized instruction informed by utilizing the Flipped Learning model to advance students' engagement and proficiency in math and literacy.

METHODS

Outcome evaluation will be measured through several assessment methods: participant pre-test and post-test, exit participant survey, follow-up participant survey and mini-lesson assessment rubric, and the assessment rubric for classroom observation. The evaluation component of the project will assess both implementation of the project (process evaluation) and the projects' impact on participants (outcome evaluation). Process evaluation was measured through sign-in sheets, the agenda, a mid-workshop survey, interviews of participants and building administrators, and daily workshop journal reflections written by the project directors. Outcome evaluation methods will be conducted to measure whether the workshop meets the project objectives and to identify possible areas of program improvement.

To achieve the objective of creating FL (flipped classroom) learning modules for teachers based upon Common Core Georgia Performance Standards, the teachers will demonstrate (through simulation experiences) the structure of the flipped classroom model, such as systematic homework instruction and in-class activities. To achieve the objective of facilitating math content area knowledge, teachers will demonstrate knowledge through pre and post-test administration. In addition, the teachers will participate in, reflect upon, and deconstruct project-based math activities. To achieve student growth in writing through content-area instruction, the teachers will learn how to effectively utilize metacognitive literacy instructional strategies and procedures.

RESULTS

Upon conclusion of the workshop, participants will be given three weeks to complete their plans for classroom implementation, which will be uploaded to the collaborative social network site for sharing purposes. The project directors and co-director will review the plans and provide each teacher with individualized feedback on the collaborative site. Participants will revise their plans for classroom implementation. The instructors and teachers will meet to review, discuss, and view classroom implementation progress.

During the academic year, the Project Directors will visit the teachers to observe the implementation and integration of activities from the workshop and facilitate continued collaboration among the entire group. A social network site called Edmodo (https://www.edmodo.com/) will be utilized to support collaborative, reflective online postings on participants' learning and implementing progress.

IMPLICATIONS AND RECOMMENDATIONS

The existing research clearly demonstrates that the Flipped Learning model can be one way to create a classroom environment that is learner-centered. The empirical experience from our project will extend the understanding of how we, as educators, can create learning environments that will better reach our future generations of students.

Current expectations as outlined in the Common Core Standards suggest that students should "write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audience" (National Governors Association for Best Practices & Council of Chief State Offices, 2010, p. 18). Writing can serve as a valuable performance assessment tool for teachers to check mathematical content-area understanding. The researchers advocate for a range of writing instructional strategies to be implemented across content area instruction. These include power writing, shared writing, and writing through annotation. Professional development on these writing instructional strategies was integrated throughout our workshop sessions in order to strengthen teachers' ability to help students meet the writing demands of the Georgia Common Core Performance Standards.

This professional development model is focused on enabling teachers to improve students' achievement in literacy and mathematics and is solidly in line with 21st century digital learning technologies. This project aims to assist teachers in increasing their knowledge of and ability to use practical technology-based instructional models

that encouraged their students to become self-directed learners. The Flipped Learning approach will help teachers achieve their goals while expanding their students' learning repertoire.

This study is significant because it presents an effort to train in-service teachers in the field of elementary education in the new teaching paradigm with a blended learning approach. This teaching method is new to teachers; there was a need and desire to learn about this teaching method. Specifically, since there is currently little research on the topic of the flipped classroom model training in early childhood and elementary education, the findings from this study will offer critical insight for educators who are and will be involved in the flipped classroom model training in the future. The structure of this workshop also shows the strong connection between literacy-math content knowledge and technology integration.

This study piloted how the flipped classroom workshop was perceived from the perspective of primary and elementary grade educators. According to our findings, the FC model is not only feasible to apply in the early childhood education sphere. There is also a high need for the FC workshop and information related to the model. It is necessary to further investigate design specifications that integrate technology into flipped classrooms based on what we have learned from this study. The self-efficacy of teachers through the flipped classroom model warrants further data collection and investigation. However, this study confirmed that design principles of the workshop were effective enough to bring about positive learning experiences for educators in regards to the new paradigm of instruction. Our future research agenda will explore additional inquiry in terms of how we can incorporate BYOT (Bring Your Own Technology) into the flipped classroom model. Since the FC model is designed to allocate more class time for active learning approaches, we believe that this model holds promise to support underachieving students in becoming more resilient learners.

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