

Why Middle School Math Teachers should consider Flipped Classroom Approach

A Literature Review

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By

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Flipped learning is increasingly being implemented in middle school math settings as a solution to bridge the gap where there are multiple grades of math learning loss. Bergmann and Sams (2012), who are credited with conceptualizing the approach, prefer the term “flipped learning”. This term was quickly modified to “Flipped Classroom”. This new approach to learning gave many educators pause as they tried to figure out how to implement this new learning strategy, ensure that students were actually learning, and trying to address the digital divide at the same time. As schools migrated to this new teaching style and increased use of technology, teachers were greatly affected as well. Additional training on use of software and tools like Google Classroom and Blackboard were needed to support this type of learning. Moreover, internet access for both teachers and students had to be made available for flipped learning classes. Finally, how should middle school mathematics lessons be adopted to support this new educational delivery system?

The purpose of this review is to examine literature associated with the effect of using “Flipped Classroom” approach in middle school mathematics classes and student outcomes such as study habits, test scores, and overall learning. The goal of the review is to inform teachers of the potential advantages of using a “Flipped Classroom” approach to teaching middle school mathematics, and how it improves the quality of instruction and student outcomes such as confidence and independent thinking. It also opens different and unique ways to teach math beyond books and paper. The goal is to encourage the use of “Flipped Classrooms” by teachers to enhance the quality of learning and help bridge the gap for those students who are at least a year or more behind grade level. This topic is of importance because of the potential for students who are behind as well as losses during COVID. Flipped Classrooms is a potential solution for a student who is a year or more below the grade level math standard.

Literature Review

The literature review will begin with definitions of specific terms to enhance reader understanding. This will be followed by theoretical framework to support the research topic. Finally, associated evidence will be identified and analyzed, and final implications will be presented.

Definition of Terms

The following terms have been defined to allow equal access of information to the reader and are important for overall understanding of the literature review.

1. Flipped classroom: “A pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter.” (Flipped Learning Network [FLN], 2014, para. 1)
2. F (“F”lexible Environment): It indicates provision of time and place flexibility of learning.
3. L (“L”earning Culture): In traditional teacher centered approach the source of knowledge is teacher. In flipped classroom approach there is transition from teacher centered approach to student centered approach.
4. I (“I”ntentional Content): Flipped classroom educators both think about how education is used to provide fluency and how they can develop cognitive understanding of students. •
5. P (“P”rofessional Educator): The responsibility of flipped classroom educators is more than the ones using traditional approach. Flipped classroom educators continuously observe

students during the course, evaluate their studies and make feedbacks (Flipped Learning Network -FLN, 2014).

Theoretical Framework

Two learning theories that apply to the research topic are the Cognitivist Learning Theory and Constructionist Learning Theory. In Cognitivist Learning Theory, states the mind is the information processor. (Jean Piaget) This method is dedicated on studying language, memory, thinking, and “consciousness”. Plato and Descartes are two of the first philosophers to dive deeply into the theory of cognitive behavior and knowledge. Their ideas about knowledge and behavior spurred further thoughts on cognition. According to behaviorism, the cognitivist learning theory cannot be studied, but of course the Cognitivist disagree. They point to Bloom’s Taxonomy and his framework as the basis of applying, associating, and retrieving information. Bloom’s helps to engage information derived from language, memory, and thinking as frameworks for building more knowledge. The flipped classroom approach to middle school mathematics, exposes the mind to different ways of thinking about math concepts which spur further understanding or cognition.

The constructivist theory is based around the idea that learners are active participants in their learning journey; knowledge is constructed based on experiences. This model was entrenched in learning theories by Dewey, Piaget, Vygotsky, Gagne, and Bruner. (Kurt, 2021) So learners adapt current information to prior knowledge to form new conclusions. Learning is an active process which involves sensory input to construct meaning. It is also an active and not passive activity because learners need to engage in a world they live in, which helps to increase learning and growing by experiences. This is more than isolated facts, but building upon the foundation, and adding to the internal data base to form new conclusions. So using a familiar math concept to

constructed on prior knowledge in a flipped classroom lesson leads to better cognition and a richer learning experience.

Advantages of Flipped Classroom Approach

Throughout the research I found three advantages of the Flipped Classroom approach to Mathematics which stood out - students are given opportunity to learn by discussing, learning is student paced not teacher paced, delivering course content outside of the classroom.

Students given the opportunity to learn by discussing

This approach is not a teacher centered class, but a student-centered class is in question and the teacher is in class as just a guide. Unlike traditional classrooms, students are required to review the lecture and notes outside of class. In traditional flipped classroom approach students come to class by watching the lecture video of previous night. The lesson starts with short questions and answers. If there are points in lecture that are not understood, they are explained comprehensively. In the rest of time, the teacher makes activities based on questioning and gives one to one support to students. In this kind of class structure, the lessons are always given as lecture video format out of course period and the teacher never teach lesson directly. Ozdamli, F. & Asiksoy, G. (2016).

Learning is Student paced not Teacher paced

In this flipped classroom approach students were expected to access the video tutorials and complete related textbook exercises in class. Students were all working at their own pace and on different topics. While some class discussions and demonstrations were observed, students tended to “opt in” according to relevance, and most of the class time was spent on individual work, with the teacher providing personal assistance when required. Muir, T. (2017).

Delivering course content outside of the classroom

Using a flipped classroom approach involves delivering the content of a course outside of class time and flipping what is typically done in class being given as homework, so that class time is used for active learning experiences (Gilboy, Heinerichs, & Pazzaglia, 2015; Van Sickle, 2016). The content from a flipped classroom is presented through a shared video, article, lecture slides, online discussion questions, use of software, or through a class website.

Disadvantages of Flipped Classroom Approach

There were also some negative based outcomes of flipped classrooms, most notably this researcher found were students may come to class unprepared to discuss the lesson and teachers lack of available technology for both students and teacher.

Students may come to class unprepared

For flipped classrooms to be successful, students must come to class prepared. That includes reviewing lectures, video's, audio, or required reading prior to class, so that class time is available for discussion and one on one questions and answers. Kordyban and Kinash, (2013) attracted attention to the point as a difficulty that how teachers can verify their students do their work outside of class well and the difficulties in case the students come to class without preparation.

Lack of available technology for both students and teacher.

Obstacles that prevent the usage of approach are expressed as students are lack of equipment such as smart phones, tablets or computers and having internet problems (Kordyban & Kinash, 2013). This is a great challenge, not only having trained teachers who know how to properly use and instruct students on the use of software and hardware for learning but also know how to train their

students on the proper use of technology and trouble shoot when something goes wrong. In addition, in the lower socio-economic areas, there is the challenge of providing laptops, tablets, to each student as well as ensuring they have access to a quality internet connection. The access barrier could in the form of a lack of service provider or the cost of bringing broadband internet into the students household.

Conclusions

This researcher stated that the purpose was to examine literature associated with the effects of using “Flipped Classroom” approach in middle school mathematics. Across the United States, student test scores are down due to low student achievement in math and the lingering affects of COVID. That’s the reason why implementing the flipped classrooms approach because it supports student achievement because it gives students the opportunity to learn by discussion, it is student not teacher paced, and it supports delivering content outside of the classroom and exposure to a wide variety of content resources which increases cognition.

This project is important because with all of the technology available and student achievement in middle school mathematics at an all time low, educators must think outside of the box with more interesting ways to present math and get students talking about math problems and concepts. The flipped classroom approach is indeed designed to accomplish just that. However, there are a couple of recommendations this researcher thinks must be addressed. Training for teachers on the use of technology. If this method of content deliver is to be truly successful teachers must be given the proper training, and time outside of the classroom to work with both the software and hardware as well as develop curriculum. In addition, more collaboration between educational systems such as the United States and Canada or Africa where more advanced math is taught at

and earlier age. Learn from what has been successful and build on that framework. If those two steps are done, this researcher believes the sky is the limit with the flipped classroom approach.

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