BOOK REVIEW

THE FLIPPED LEARNING SERIES:
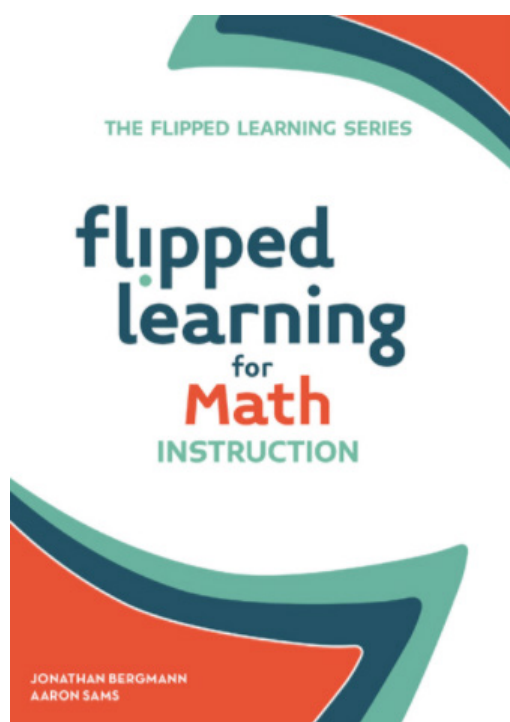## FLIPPED LEARNING FOR MATH INSTRUCTION
Written By Jonathan Bergmann and Aaron Sams

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INTRODUCTION

Active learning as a meta-strategy of meaningful learning is an essential ingredient for the effective learning of students as it actively engages the students, enhances interactivity and encourages them to acquire the knowledge with reason. It can impact the way the students receive, process and assimilate the information disseminated to them by utilizing their cognitive skills of understanding, analyzing, evaluating and creating, thereby constructing their own knowledge. Thus in such a situation the role of teachers happens to experience a profound transformation from being merely the "disseminators of content" to "facilitators of learning" which is rather easily said than done. In most of the cases it is found that the teachers are unable to culminate into the so called "facilitators of learning" as they need to finish the bulky syllabus in a stipulated time. In order to achieve the predetermined syllabus and the students being the novices, 58% of the classroom time is spent in interacting with the new content, 36% is used for practicing the content and just 6% is utilized for cognitively complex work (Marzano & Toth, 2014). These figures need to be changed especially in a mathematics classroom where students need to learn the varied ways to apply math in the real world rather than just knowing the computation. But how do math teachers transform themselves into "facilitators of learning" thereby creating a deeper learning environment in their classrooms?

REVIEW OF THE BOOK

The book, Flipped Learning for Math Instruction addresses this crucial issue of creation of a deeper learning environment in classrooms by advocating "Flipped learning" as a meta- strategy that can assist in reinventing the classroom time and practically accommodating active learning into the math classroom thereby producing more meaningful learning. Flipped learning can be defined as a subset of blended learning where

the students watch video lessons at home and come prepared for the higher order cognitive activities to be carried out in the classroom. Authored by Jon Bergmann and Aaron Sams, this book is a part of the Flipped Learning series that was essentially designed for the teachers of different subjects and grade level. It describes the flipped learning approach to be used for math instruction by proceeding from whole to parts approach with a plethora of experiences provided by the real math teachers using flipped learning in the real math classrooms. The authors being the pioneers of flipped learning believe that the flipped learning is not just a time shift but its focal point is active learning thereby placing teachers as facilitators of learning. The book deals with the varied ways to flip a math class, overcome the barriers of the flipped classroom, develop lesson plans, utilize the face-to-face class time, integrate projects, inquiry and mastery model and familiarize the teachers with the different math resources used in flipping.

The primary objective of the book is to capture the process of flipped learning that can be specifically utilized for various topics in a math classroom. The second objective is to vehemently recommend flipped learning in conjunction with numerous constructivist approaches to promote a culture of inquiry among the math students in the school. The authors believe that the flipped learning not only has a positive effect in the lives of the students by transforming their learning environment but also has a deep impact on the professional lives of the teachers by altering their teaching practices to suit their unique contexts.

The book is comprised of ten chapters. The first chapter defines the term flipped learning, provides an array of benefits driven out of flipped learning that ultimately guides us to the reasons behind flipping, the best way to utilize face-to face classroom time and brings out the differences between a flipped class and flipped learning. The second chapter highlights the four major hurdles to flipping namely flipping ones thinking, technological barriers, finding time and training parents, students and at the most oneself and it even suggests some ways to overcome them. The third chapter illustrates the approaches to plan a unit for the flipped classroom, maximize student engagement and manage chaos. The fourth chapter deals with incorporation of interactive math resources in flipped learning like use of math manipulatives, interactive simulations and tools and student- created content. The fifth chapter thoughtfully explores traditional resources that can help teacher to complement their instructional videos. All the more it presents the idea of giving a choice to students to consume information in multiple modalities that in turn helps to increase their engagement. The sixth chapter focuses on the various strategies to maximize the face- to- face class time so that students develop a deeper understanding of the concept and truly learn math. These may include activities where solving worksheets and practice lie on one side of the continuum and the other side of the continuum involves higher-order cognitive activities. The seventh chapter explains how to successfully move from a flipped class 101 to a flipped mastery learning environment in math by providing two exemplary examples wherein successful implementations of the flipped- mastery model have been initiated by the math teachers. The eighth chapter suggests various ways to adapt the flipped learning model in order to merge it with an inquiry- based approach to learning. The ninth chapter showcases the initiatives of two math teachers to substantiate the idea that the flipped videos support projects and project based learning in the math classroom. Finally in the tenth chapter the authors arrive at a conclusion that this book should be regarded as a guide for the math teachers and also warn that instead of replicating everything in this book, the teachers should adopt practices most appropriate to their teaching contexts. The authors suggest some action steps to start flipping their math class and encourage the teachers to use constructive approaches to learning in conjunction with flipped learning.

The most significant contribution of the book is the innovative way it suggests for reaching out each and every student by optimally utilizing the class time and that too without compromising with the predetermined syllabus thereby empowering the teachers. This atypical method of teaching, promises to practically accommodate all the active learning strategies that makes the adoption of constructivism pedagogy in a classroom a reality. Moreover this flipped learning approach seems to be the best fit for the students of the information rich world where the content pertinent to their syllabus is readily available in the form of text, video or audio and helps to recuperate the class time for other higher order learning tasks. Thus it serves dual purpose of having a deep impact upon the professional development of the teachers and enabling the students attain indepth knowledge at one go.

Through the narrative accounts of real math teachers, the authors shed light on how flipped learning is possible in every math classroom in multiple ways. By presenting the valuable insights into the process of flipped learning and impact on their teaching practice it empowers the math teachers to transform their

classrooms by improving their teaching practice. Right from developing the lesson plans to the assessment of the students the book has successfully captured the process of flipping the classroom. Authors have also attempted to elaborate the process of flipping through several instances like Julie Schell's steps for peer instruction, Graham Johnson's flipped mastery class insights and Adam Johnson's guided enquiry process.

The anecdotal benefits of the flipped learning cited in the book by the math flippers presented by the authors make it quite compelling for the math teachers to start flipping their classes. For example the authors said about a 5-6th grade math teacher, Enoch Ng -

He was frustrated as he was unable to help his struggling and advanced students. The only students he felt he was reaching were a few in the middle...........As he began to implement flipped learning, he realized that there was a way to help the vast majority of his students......Enoch is now able to meet the needs of all his students. (p.4)

Another math teacher, Adam Johnson admits that after flipping his classes with efficacy he discovered an array of benefits like the model enhanced his students' engagement, increased individualization, inculcated a culture of learning, provided him more time to help his struggling students, fostered a positive cognitive dissonance and made the school transparent. One of the teachers Graham Johnson who indulges in flipped mastery points out that he earlier feared that flipped learning would reduce the time to let him know his students yet he was amazed to find out that instead flipped learning build better teacher-student connections as he could not only recognize and diagnose the learning challenges of his students but also helped them to overcome them. The Algebros of Defense School in Germany commented that before implementing flipped learning they found it difficult to meet the needs of individual student as their school received new students at any time round the year thereby making the classes heterogeneous but flipped mastery class rescued them by creating rich and individualized environment. Again, a K-12 teacher Ben Rimes used video story problems in his flipped classroom and was able to make connection of mathematics with the real world that was truly beneficial for students.

This book is indispensible for neo- flippers in math instruction as it explores the practical ways to integrate flipped learning in their real classrooms by incorporating the resources for aid. The resources enlisted in the book for example Math Manipulatives like National Library of Virtual Manipulatives; Interactive Simulations like Geogebra, Desmos, PHET Interactive Simulations, Explore Learning Gizmos and Student-Created Content like videos created by the students on their own, all encourage the teachers to get started with the flipped learning by utilizing the ready to use resources.

Apart from process and product, the book also discusses the four major hurdles to flipping namely mentally getting prepared for flipping, technological barriers, finding the time, training oneself, students and parents and even suggests some definite practical ways to overcome these hurdles. Indeed it has all the essential ingredients that a neo- flipper needs to get started.

While the book has several strengths yet at times it is disappointing for the readers. The authors often suggest referring to their previous books for instances

There are many other benefits, which we have chronicled in our aforementioned previous books. (pg.6).....We chronicle this transformation well in our book Flipped Learning: Gateway to Student Engagement.(pg.8).....We encourage you to read the second half of our first book, Flip Your Classroom, and read Flipped Learning...(pg.73)....Pick up a copy of Flip Your Classroom and the accompanying workbook.(pg.91)

These statements reflect as if the authors are self advertising their books. This also suggests that this book is incomplete and not a stand alone.

The audience of the book as stated in the back covers namely the Grade 5- 12 math teachers and curriculum specialists may not be comfortable implementing the flipped learning for two reasons. First it would have been wise to provide the list of successful flippers in the appendix which would have eased the process of finding them at the back rather than searching for them in the book. Moreover websites, blogs or contacts of the persons indulged in flipped learning is vital for the neo-flippers because in case they get stuck during flipping they could approach those experienced flippers who have already implemented Flipped Learning and are more familiar with the process and pros and cons of this approach. Secondly, flipped learning guidelines and templates helpful for better implementation of flipped learning in the real classrooms are missing in the appendix.

This flipped learning method may not seem appealing to the math teachers who are not tech savvy as the entire book discusses about flipped learning as a pedagogical concept having a technological input. Whether it is about developing lesson plans or teaching aids, out-class activities, in-class activities or assessments the book gives a multitude of references of links, software or technological tools which can put the math teachers following traditional methods of teaching in dilemma to whether or not initiate flipped learning in their context. Though the book mentions about the use of traditional resources like the use of textbook but fails to demonstrate the proper strategies to incorporate it into the classroom teaching. Moreover it stresses the teachers on creating video lessons of their own which many may not find comfortable as there is no proper guidelines as how to initiate the process.

The book lacks a strong theoretic stance and very scarce empirical evidences are cited which can altogether create a skeptical attitude among the math teachers towards the flipped learning approach. Moreover some questions still remain unanswered like what should one do in case the students don't watch the video? or If the students don't have access to technology at home? These are indeed the most pertinent and essential doubts that the neophytes need to come prepared with before they start flipping their classes.

CONCLUSION

In the information rich world of twenty- first century where a teacher needs to be transformed into a facilitator of learning, flipped learning can truly serve the purpose. The book is a pioneering work in flipped learning and a first of its kind in flipped learning for mathematics. The information provided in this book about flipped learning motivates and guides the math teachers, both in-service and pre-service, NGOs in education and curriculum experts by familiarizing them with the fundamentals of a flipped math classroom with several real life experiences of the math teachers. It redefines the position of teachers from being mere "disseminators of information" to "facilitators of learning" in real sense.

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