

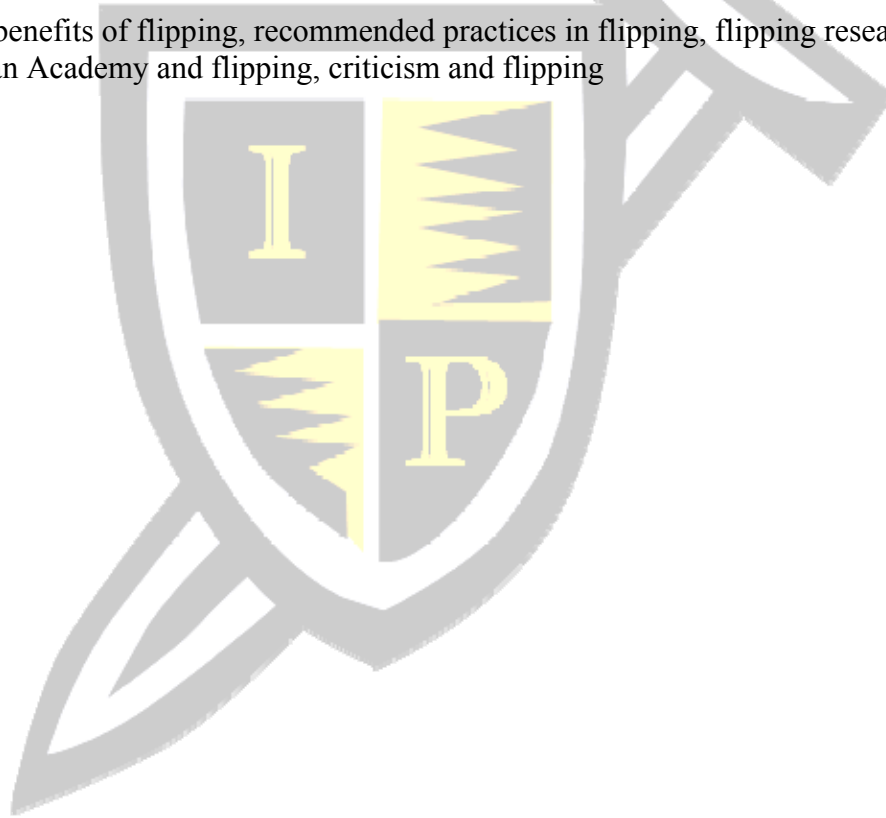
## Deep exploration of the flipped classroom before implementing

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### ABSTRACT

This paper is a review of the literature that attempts to explain and document the literature on the flipped classroom. It examines 49 studies that explain the flipped approach in the classroom. This paper, particularly, delineates the history, the theory, benefits, criticisms, recommended practices, and what the research on flipping reveals. After reviewing the literature, the author concluded that there is a resurgence in the use of the flipped classroom. This body of information representing the work of teachers, principals, and college professors will serve as a useful source in deciding whether or not to execute the flipped classroom as a viable teaching methodology.

Keywords: benefits of flipping, recommended practices in flipping, flipping research, flipping history, Khan Academy and flipping, criticism and flipping



## INTRODUCTION

The flipped classroom is experiencing the most successful resurgence of any method for delivering content in the classroom (Hennick, C., 2014; Strayer, J. F., 2012; Kim, M.K., Kim, S. M., Khera, O., & Getman, J., 2014; Sparks, S. D., 2011)). There is certainly a renewed interest in implementing this digital approach for teaching today's students. Khan Academy has been at the forefront of this overnight sensation (Hennick, C., 2014; Sparks, S. D., 2011)).

## PURPOSE

The purpose of section one of this paper is to examine a definition, some history, and the theoretical basis for the flipped classroom. Other areas located in section two will examine the lecture method, today's students, and teaching pressures. The third section of the paper discusses the benefits, advice, criticisms, and the research. There is a summing up section and finally it concludes with a closing.

## SECTION ONE- Definition, History, and Theory

The flipped classroom can be described as individual video-based learning outside the classroom and group learning inside the classroom (Bishop & Verleger, 2013). The classic definition is about videos taking the place of direct teaching with more individual time for students during class time. Homework is no longer done at home, but in class, thus the term flipped or inverted classroom (Bergmann, Overmyer & Wilie, 2013).

The flipped classroom should not be described as a series of online videos that take the teacher's place and leave the students with no sense of direction (Bergmann, Overmyer & Wilie, 2013). Flipped classrooms that are successful embody these traits (Bennett, Kern, Gudenrath & McIntosh, 2012; Cohen & Brugar, 2013):

1. Students lead discussions in class of outside content studies and gain more knowledge.
2. Students demonstrate high order thinking skills.
3. Students apply content to contextually real situations.
4. Students mentor and collaborate with one another and own the learning and can review videos as needed.
5. Students ask deep questions and motivate one another and get to really build a relationship with the teacher.
6. Students engage in active learning and move from just sitting.

The idea of flipping the classroom has gleaned lots of media attention from USA Today, The Globe, Washington Post, and CNN, though it has been around for over a decade (Johnson, 2013). The Khan Academy has been useful because of its free offerings of materials (Baker & Settle, 2013). The academy is about the work of Salman Khan who created a collection of online videos covering a plethora of subject areas known as the Khan Academy. Salman Khan was a hedge-fund analyst who quit his job in 2006 and has since received backing from Bill Gates and Google. Many people partially credit him with the popularity of the flipped classroom (Ash, 2012). The term flipped actually came from a man called Karl Fisch, teacher and technology expert, who first called it the *Fisch flip* but he credits Bergmann and Sams with it all (Sams, 2011). Some view flipping as an exchange of classwork for homework. It is also called backwards classroom, reverse instruction, flip teaching, and reverse teaching (Siegle, 2014).

There is no *one* way to flip and some describe as a mind-set or an ideology but not a method (Siegel, 2014).

Two rural secondary teachers of chemistry, Jonathan Bergmann and Arron Sams are considered as the ones who popularized the flipped classroom (Handen, McKnight, P. McKnight, K. & Arfstrom, 2013; Siegle, 2014). Apparently, they noticed that students were missing class to attend competitions, games, or other student activities, and there were other students who had trouble with certain concepts which hindered completing homework until they got help in class the next day. This led to using videos to record lectures, demonstrations, and presentations that they decided to post on YouTube for students to view (Handen et al, 2013; Siegel, 2014).

Bergmann and Sams started a non-profit Flipped Learning Network (FLN) in 2012. It is known as the FLN Ning which is a free website offering information, resources, and what one needs to know when flipping a classroom. It has now reached 12,000 educators (Handen et al, 2013). Since the growth is expanding, the researchers at George Mason University with the Support of Pearson wrote a white paper to further explain the model (Handen et al, 2013).

In 2012, Jonathan Bergmann and Aaron Sams introduced their book, *Flip your classroom: Reach every student in every class every day*. The book is useful in that it is a non-traditional way of teaching (Hantla, 2014). The authors, for instance, recommend that teachers create their own content videos. These teacher-made videos should contain humor, fun, and animation. Having another co-worker teach on the same content topic is recommended. The authors have moved away from the laborious lectures but instead recommend short videos with an offering of many ways to assess student learning. They discuss how paper work for teachers can be cut in half. There is a section of the book for experienced flippers who need additional challenges. The importance of following the guidelines for copyrighting is discussed.

Social constructivism is at the root of the flipped classroom (Jarvis, Halvorson, Sedeque & Johnson, 2014). The flipped classroom is often linked to problem solving, inquiry learning, and active learning plus interpersonal communications (Jarvis, et al, 2014). In the flipped classroom, students learn new knowledge that they must connect to past learning, and this causes them to realign their view of the world. They converse with peers in the classroom that ultimately lead to deeper learning. The process of learning as Piaget and Vygotsky explain it, is apparent. But isn't that what an education should do, push us to probe and compete with others while adapting to the world around us and simultaneously being influenced by parents and friends in our immediate circle? The social constructivist theory undeniably fits with the benefits of the flipped classroom.

## **SECTION TWO- Lecture Method, Today's Students, Teaching Pressures**

The lecture method is still number one in most classrooms (Roehl, Reddy, Shannon, 2013). Educators need to get beyond memorized learning to higher-level thinking processes, thus the flipped classroom, which offers active learning. Active learning approaches include small groups, individual, and cooperative groups where students collaborate, brainstorm, role-play, peer-tutor, map, or produce projects (Roehl et al, 2013). The lecture method is described as a scripted speech to students with the hope that the learning of all the information will be regurgitated (Mazur, Harvard Professor, 2012).

Donald Clark (2007), an educational blogger, described the lecture in negative terms as one that creates passive students who are dependent on writing good notes when their attention span is lost after 10-20 minutes. He goes on to explain that lectures deliver too much content for

students to process. He questions why they are presented on a specific content area at only one specific time and place. Often, when presenters are boring, it is because they are not trained in how to keep and maintain the attention of the audience. He concludes with a note of hope when he says that lectures can be worthwhile if they are timely and if the presenter can get students engaged in the delivery.

Students of today have been referred to as digital natives or millennial students (Prensky, 2001). They have experiences with technology at an early age unlike other students in other generations (Prensky, 2001). These students learn differently because the social media that they use often is a way of life (Roehl, Reddy, Shannon, 2013). They need collaborative learning experiences (McMahon & Pospisil, 2005). Mark Prensky (2001) discussed how these digital natives learn differently than those before them. They have different desires and not the same kind of patience with learning (Prensky, 2010) They have information at hand and are familiar with participating in environments calling for involvement and reaching out to peers (McMahon & Pospisil, 2005). Through the internet, they can ultimately connect with others around the world ( McMahon & Pospisil, 2005). Flipped classrooms emphasize students as the center for learning and not the teacher as the lead act on stage but a facilitator in the background (Siegle, 2014).

In training pre-service teachers, faculty is highly encouraged to teach pedagogical methods utilizing technology because their future students will be digital natives (Vaughn, 2014). Pre-service teachers will need to prepare to teach students who have already participated in online learning and using technology daily (Vaughn, 2014). Statistics report that 97% of classrooms have computers and 93% have the internet available in classes daily (U.S. Department -National Center for Educational Statistics, 2011). Meanwhile, universities and school systems are looking for ways to save money on strained budgets (Berrett, 2012). In larger research universities the lecture method is not going to cease. Economically, it is more practical to have larger bodies of students in a course with one instructor (Berrett, 2012). The flipped classroom can be a more productive way to teach to large class loads (Berrett, 2012 p.2).

Faculty members could use their time differently and serve as part of the new transition in teaching and learning (Berrett, 2012). Flip classrooms utilize video lectures from renowned educational speakers. Politicians, policy persons, and other groups want to see how technology is tied to the education of students in colleges. After all, Noam Chomsky, an American linguist and philosopher, was accurate when he retorted that education's purpose is to train students to grow to the stage where they can learn on their own (Elets News Network, 2014).

### **SECTION THREE- Benefits Using Specific Cases, Advice, Criticisms of the Method and the Implementation, and the Research**

There is a wide spread degree of curiosity about using the flipped classroom (Hennick, 2014). It is an approach implemented in Spanish, science, math, elementary, middle, high school, and it is used with older adults (Patel, 2013). It is imperative that possible benefits are explored here. Morgan (2014) declares that the flipped classroom allows for self-pacing yet students are assured of feedback from the teacher thus keeping the teacher aware of any misunderstanding of the content. Other advantages include students having access to the video to view whenever they need to. Another aspect deals with the fact that the teacher is free to create videos that can be challenging and can involve other co-workers with whom they can exchange views.

Parents can view the videos and can help with homework. At Byron High School in Minnesota, the district was able to save some money on textbooks when flipping started (Morgan, 2014). Teachers created lessons and posted to You Tube with the creation of a free Moodle site. Students also showed improvements academically and others wanted to partake in the flip, for example science, social studies, and language arts faculty (Morgan, 2014). Byron High was able to attract an even better caliber of educators and received a national award in math called the Intel School of Distinction in 2011 (Fulton, 2012, April). The flipped classrooms used the Khan Academy videos created by a Harvard business school graduate who was trying to aid his cousin in math and decided to place steps on You Tube, which marked the beginning of the successful Khan Academy.

In Los Altos, California in 2010, the district experimented with math for 5<sup>th</sup> graders and utilized Khan Academy. With success of the program, they branched out to all 5<sup>th</sup>, 6<sup>th</sup>, and 7<sup>th</sup> grades. This program allowed teachers to keep up with how well students were doing and how many they got correct or not correct and how much time was spent per problem. Teachers could see if students got the problems correct when hints were given.

Roehl, Reddy & Shannon (2013) explicated on how students got to reflect on their learning and how teachers gave immediate feedback. Teachers used voiceovers for videos, screen capture software and gave instructions with visual aids. Students asked questions at class sessions instead of interrupting a lecture. The class did not slow up because of students not attending due to sports, participation in competitions, or other extra-curricular activities. Teachers made changes to videos as needed.

There were 15,000 members surveyed through the National Center for Case Study Teaching in Science List-Serve which reported (Herreid & Schiller, 2013) that teachers could spend more time on research projects with students, teach science equipment, allow students to interact through activities (i.e., games, paragraphs, contests, problem solving). Students had time to think in and out of class. Students seem to enjoy participating in the flipped classroom. A physics teacher commented on how students viewed the podcast at home and when class sessions met, students did meaningful assignments applying what they learned from viewing (Herreid & Schiller, 2013). It seems that 86% of science faculty use lecture as main method for explaining (Gates & Mirkin, 2012).

Fulton (2012, October) discussed a survey from parents in the Byron School District in Rochester, Minnesota where 84% agreed that the flipped approach was number one method for teaching content. She continued with benefits such as how teachers could spend more time with what students did not comprehend. Teachers could provide many other sources for teaching and were able to chunk the content as needed and not overload students. It is important to note that there is no one way for classroom flipping (Jarvis, Halvorson, Sadeque & Johnston, 2014).

The advice or recommended practices offered here should help get the maximum out of this teaching strategy. *First*, educators must prepare motivating, in-class activities so students can use content information in real-life situations and will not waste class time (Spencer, Wolf & Sams, 2011). *Second*, educators who choose to record their own videos should choose a recording spot carefully, organize content ahead of time, record as though talking to students, and repeat as many times as needed for the course (Seigle, 2014). Teachers who choose to use available videos should select from videos, such as, Khan Academy, You Tube EDU, and PBS (Seigle, 2014). Videos should be short and simple and specifically connect to assignments (Patel, 2013).

*Third*, educators should prepare students for this process by discussing the benefits, making a list of what and why students need to know the content from the video; setting deadlines for students; offering a time for them to watch the video, and preparing worksheets, quizzes, questions to answer after watching the video (Siegle, 2014; Miller, 2012; Ash, 2012).

*Fourth*, educators must give feedback that is immediate and on target while figuring out early which steps in the process are working for students (Berrett, 2012).

*Fifth*, flipping does not replace the teacher but the teacher becomes more of a mentor or facilitator who still gets to experience the light bulb moment (Hennick, 2014). Teachers who create their own videos must make time for carrying out the process (McLean & White, 2009). Additionally, do not assume students are comfortable with the technology (McLean & White, 2009). A survey from Harrison Group 2006 (McLean & White, 2009) found that students spent more time downloading music, 85%, videos 10% and podcast and audio texts under 5%. Another important concern is that small schools often do not have the resources or power needed to integrate technologies as larger universities do (McLean & White, 2009).

Before transitioning to the research studies, it is essential that the criticisms of the method and the pitfalls in implementation are reviewed. Herreid, Schiller, Herreid & Wright (2014) criticize the method when students tend to resist this process and may attend class ill-prepared. This can be averted with the use of short online quizzes or in class quizzes or required assignments tied to information covered from reading or videos from the night before. Another problematic area may be locating quality videos.

In criticizing the implementation of the method, teachers must choose carefully when producing videos (Siegle, 2014). Siegle encouraged the use of Camtasia Studio, Papershow, or ShowMe software programs or apps on the iPad like Educreations and Explain Everything. Teachers should post videos on YouTube, iTunes U or Podcasts (Vodcasting) or management systems like Blackboard or Moodle. Creating classroom videos is extremely time-consuming (Siegle, 2014). Siegle (2014) recommends Jing as the most popular software program. Lectures and videos of no-cost are available on Apple's iTunesU, YouTube, TedTalks and Screencast-o-matic website (<http://www.screencast-o-matic.com>).

Morgan (2014) takes issue with the method when he refers to the flipped method as a high tech method of the lecture unconcerned about how students really learn. Andrew Miller, ASCD Educational Consultant in Virginia, describes it as an old-fashioned approach or a better version of a terrible teaching strategy (the lecture). Khan Academy has encouraged inflated goals too exorbitant to accomplish because the problems of k-12 will not dissipate through digital transactions.

Talbert (2012) finds fault with the method because he uncovers students' feelings of being alone in learning with a form of cultural shock at this opposite way of participating in a classroom. Instructors must ultimately collect numerous formative activity results to demonstrate student learning and to convince students of their progress. Instructors must diagnose and delineate areas of concern about what students are not learning as well. Handen, McKnight, McKnight & Arfstrom, (2013) digress on to a loss of the most loved, Socratic, in- your-face method of teaching. There is a fear of hiring poor, low-level teachers who would take the positions of the highest paid experienced teachers.

Some of the criticisms of the implementation are explained here. It is not fair to expect students to view videos for every class every evening. Videos must be short, 5 to 10 minutes for viewing outside of the classroom (Siegle, 2014). Teachers do not possess the skills to make all of the videos needed to teach the content for lessons. Educators will be forced to become more tech

savvy than ever before as technology continues to grow (Roehl, Reddy & Shannon, 2013). Bergmann and Sams, the founders, explained (Roehl, Reddy & Shannon, 2013) how they checked students' notes every day from video watching the night before. Each student brought a question to class. They gave students time to adjust to the process and in time, saw improved questions brought to class. There was a change in thinking to a more deeply-fashioned as the school year progressed. There were financial considerations to ponder in the public schools and whether or not if students have the technology outside of school before deciding about this endeavor (Roehl, Reddy & Shannon, 2013).

Implementation presents problems because the method relies on online materials and will be problematic unless there is a suitable technology infrastructure (Sparks, 2011). This method is still in its early stages, still developing (Sparks, 2011). The top-down implementation (making it a requirement for all) will not work, but teachers who want to flip and believe in flipping will make a difference (Hennick, 2014). Labs may not be open after school for students to work in, but they will need this time. Flipping should be for certain classes. Berrett (2012) reminds us that professors must answer questions at a minute's notice and this means additional preparation/planning time before class.

Education Next (2013) suggested that the flipped classroom method is problematic since it may only work for upper-income, suburban, or private schools. Parents are expected to provide the technology and it may cause students to get behind. Perhaps this will just highlight the inequities from district to district. It is questionable that the charter schools (KIPP, Rocketship, Alliance, and Summit) that demonstrate success for low-income students are not jumping on board with the flipping trend. This method will not likely result in massive improvements needed in learning in our country. Most students will continue to matriculate in the rectangular school houses that have adapted some form of technology for learning (Education Next, 2013).

Johnson (2013) sums up criticisms in the method with these points: 1.) It frees students from physically attending class. 2.) It is a showdown of division-those who have the technology and those who do not. 3.) It makes the teacher seem pretty much unnecessary. 4.) It does away with a real-life teacher bringing a good in-person lecture.

Now we examine the research available on this method. While there are limited empirical studies on the impact of the flipped approach on learning, there are research reports from teachers on the use of the approach. This section will summarize research from k-12 and higher education.

In Minnesota, at Byron High School (Fulton, 2012, June-July) the teachers decided to flip the curriculum in the math department. The teachers rewrote lessons, located materials on the internet, and created their own short videos, 10 or 15 minutes that students could watch at home. They saw a mastery from 29.9 percent in 2006 to 73.8 percent in 2011 on Minnesota Comprehensive Assessments and saw a rise on ACT scores from 2006 (21.2 on scale of 36) to 2011 (24.5). The school received the National Blue Ribbon School in 2010 by U.S. Department of Education. They were given the Intel's School of Distinction Award in high school math in September 2011.

At Clintondale High School in Michigan where majority were inner city kids (Johnson, 2013; Handen, McKnight, McKnight & Arfstrom, 2013), the school decided to flip all of its ninth grade classes in 2010. They saw failure drop close to 33 percentage points and the number of discipline cases went from 736 in 2009 to 249 in 2010 to 187 in 2011-74% drop in two years (Green, 2011). Parental complaints dropped (200 to 7). The school went to a flipped model in fall of 2011.

Musallam in 2010 wanted to determine the use of screencasts (a video recording of computer screen) as a pre-teaching approach for instructing an AP high school chemistry course. In examining pre-and post-assessments, he saw an increase in performance on assessments (Johnson, 2013).

Strayer (2012) compared the traditional introductory statistics class to a flipped statistics course through the use of field notes, interview focus groups, and the University Classroom Environment Inventory. The flipped classroom students were less satisfied with the structure of the classroom but became more open to newer approaches to teaching. Leicht, Zappe, Litzinger, and Messner (2012) decided to flip an architectural engineering course of freshmen. The results on the Student Assessment of their Learning Gains (SALG) showed that the flipped class of students outperformed the traditional classes with higher final exam scores and overall success in the class. Comments on the survey revealed more interest in the course, less intimidation of chemistry, and how useful the videos and powerpoints were.

Day and Foley (Bishop & Verleger, 2013) used the flipped approach in a senior-level computer interaction course. In comparing the experimental and control group, the students in the experimental section scored higher on all homework assignments, projects, and tests. At the University of California at Irvine, an introductory biology course used the flipped classroom. The results showed an increase on the average of 21% better on exam questions that were usually taught through traditional lecture. Professors reported (Papadopoulos & Roman, 2010) that students in an electrical engineering class after using the flipped method moved faster and helped their peers with learning. The test scores were well above those in the traditional courses.

## Summing Up

According to Handen, McKnight, McKnight & Arfstron's Whitepaper (2013) there are few quantitative and qualitative studies on the flipped approach but there is research that substantiates student achievement after using the approach. Surveys from principals and superintendents interested in the model as well as positive comments from parents exist. *The flipped classroom: A survey of the research* (2013) authored by Bishop & Verleger concluded that students rate the approach positive but a few students are not happy with the model. It goes on to say that if a quiz is given after viewing videos, prior to the class meeting, it works best. In addition, students like face-to-face teacher lectures but prefer the activity-based class meetings. Also, students want short videos over longer ones. In higher education classes in the United States, Vaughn (2014) examined a number of studies that demonstrated improvements in student engagement, preparation, and achievement for the flipped approach. From participating in the writing of this paper three ideas for future studies were shared. Johnson (2013) shared in his dissertation a lack of studies on student perceptions of the flipped classroom. Jarvis, Halvorson, Sadeque, & Johnson (2014) discussed a need for a guide to best practices, and finally Vaughn (2013) discussed how little is known about the flipped approach and the infrastructure across university campuses.

## Closing

The flipped approach is not for every class or every teacher. Teachers would benefit from training in how to actively get students involved in the approach. There must be a change in



thinking if this approach will work for teachers and students. What we can learn from this approach is how powerful active teaching is in the classroom. Trying to encourage students to come to class prepared is not a new battle for teachers because teachers understand the effect prepared students can have on how much can be learned. The most important feature in this approach is still the teacher who understands the learners and has a repertoire of many teaching methods. Bergmann and Sams, the founders, believe that teachers should use the videos they create and offer other sources as alternatives. In this digital age of differentiation, teaching will continue to evolve

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