Flipped classroom

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Jump to: navigation, search

Flipped classroom is an instructional strategy and a type of blended learning that reverses the traditional learning environment by delivering instructional content, often online, outside of the classroom. It moves activities, including those that may have traditionally been considered homework, into the classroom. In a flipped classroom, students watch online lectures, collaborate in online discussions, or carry out research at home and engage in concepts in the classroom with the guidance of a mentor.

In the traditional model of classroom instruction, the teacher is typically the central focus of a lesson and the primary disseminator of information during the class period. The teacher responds to questions while students defer directly to the teacher for guidance and feedback. In a classroom with a traditional style of instruction, individual lessons may be focused on an explanation of content utilizing a lecture-style. Student engagement in the traditional model may be limited to activities in which students work independently or in small groups on an application task designed by the teacher. Class discussions are typically centered on the teacher, who controls the flow of the conversation.[1] Typically, this pattern of teaching also involves giving students the task of reading from a textbook or practicing a concept by working on a problem set, for example, outside school.[2]

The flipped classroom intentionally shifts instruction to a learner-centered model in which class time explores topics in greater depth and creates meaningful learning opportunities, while educational technologies such as online videos are used to 'deliver content' outside of the classroom. In a flipped classroom, 'content delivery' may take a variety of forms. Often, video lessons prepared by the teacher or third parties are used to deliver content, although online collaborative discussions, digital research, and text readings may be used.[3][4][5]

Flipped classrooms also redefine in-class activities. In-class lessons accompanying flipped classroom may include activity learning or more traditional homework problems, among other practices, to engage students in the content. Class activities vary but may include: using math manipulatives and emerging mathematical technologies, in-depth laboratory experiments, original document analysis, debate or speech presentation, current event discussions, peer reviewing, project-based learning, and skill development or concept practice.[6][7] Because these types of active learning allow for highly differentiated instruction,[8] more time can be spent in class on higher-order thinking skills such as problem-finding, collaboration, design and problem solving as students tackle difficult problems, work in groups, research, and construct knowledge with the help of their teacher and peers.[9] Flipped classrooms have been implemented in both schools and colleges and been found to have varying differences in the method of implementation.[10]

A teacher's interaction with students in a flipped classroom can be more personalized and less didactic, and students are actively involved in knowledge acquisition and construction as they participate in and evaluate their learning.[3][11][12]

Contents

- 1 History
  - 1.1 In practice
- 2 Flipped mastery
- 3 Limitations and criticisms
- 4 With other educational approaches
- 5 See also
- 6 References
History[edit]

In 1993, Alison King published "From Sage on the Stage to Guide on the Side," in which she focuses on the importance of the use of class time for the construction of meaning rather than information transmission. While not directly illustrating the concept of "flipping" a classroom, King's work is often cited as an impetus for an inversion to allow for the educational space for active learning.[13]

Harvard professor Eric Mazur played a significant role in the development of concepts influencing flipped teaching through the development of an instructional strategy he called peer instruction. Mazur published a book in 1997 outlining the strategy, entitled Peer Instruction: A User's Manual. He found that his approach, which moved information transfer out of the classroom and information assimilation into the classroom, allowed him to coach students in their learning instead of lecture.[14][15]

Lage, Platt and Treglia published a paper entitled "Inverting the Classroom: A Gateway to Creating an Inclusive Learning Environment" (2000), which discusses their research on flipped classrooms at the college level. In their research focusing on two college economics courses, Lage, Platt, and Treglia assert that one can leverage the class time that becomes available from the inversion of the classroom (moving information presentation via lecture out of the classroom to media such as computers or VCRs) to meet the needs of students with a wide variety of learning styles.[16] The University of Wisconsin-Madison deployed software to replace lectures in large lecture-based computer science course with streaming video of the lecturer and coordinated slides.[12] In the late 1990s, J. Wesley Baker was experimenting with these same ideas at Cedarville University. He presented a paper discussing what he termed the "classroom flip" at an education conference in the year 2000 in what may be the first published mention of the word "flip" associated with this model of teaching and learning.[18]

In 2007, Kaw and Hess published a paper where they compared the effectiveness of 4 instructional modalities for a single topic of a STEM course -(i) traditional lecture, (ii) blended (what they called "Web-enhanced lecture"), (iii) Web-based self-study and (iv) flipped (what they called "Web-based self-study and classroom discussion"). Statistical analysis of the assessment data indicated that the second modality, in which Web-based modules for instruction were used during face-to-face lecture delivery mode, resulted in higher levels of student performance and satisfaction.[19]

Perhaps the most recognizable contributor to the flipped classroom is Salman Khan. In 2004, Khan began recording videos at the request of a younger cousin he was tutoring because she felt that recorded lessons would let her skip segments she had mastered and replay parts that were troubling her.[20][21] Salman Khan founded Khan Academy based on this model. For some, Khan Academy has become synonymous with the flipped classroom; however, these videos are only one form of the flipped classroom strategy.[22]

The Wisconsin Collaboratory for Enhanced Learning has built two centers to focus on flipped and blended learning. The classroom structure houses technology and collaboration-friendly learning spaces, and emphasis for those involved in the program is placed on individualized learning through non-traditional teaching strategies such as flipped classroom.[23]

In practice[edit]

Woodland Park High School chemistry teachers Jonathan Bergmann and Aaron Sams became driving forces in flipped teaching at the high school level when, in 2007, they recorded their lectures and posted them online in order to accommodate students who missed their classes. Bergmann and Sams note that one person cannot be credited with having invented the inverted or flipped classroom. Furthermore, they assert that there is no 'right' way to flip a classroom as approaches and teaching styles are diverse, as are needs of schools.[6]
In 2011 educators in Michigan's Clintondale High School flipped every classroom. Principal Greg Green led the effort to help teachers develop plans for flipped classrooms. He worked with social studies teacher, Andy Scheel, to run two classes with identical material and assignments, one flipped and one conventional. The flipped class had many students who had already failed the class—some multiple times. After 20 weeks, students in the flipped classroom were outperforming students in the traditional classrooms. Further, no students in the flipped classrooms scored lower than a C+. The previous semester 13 percent had failed. The traditional classroom showed no change.[24]

Clintondale had been designated as among the state's worst 5 percent. The next year when teachers used a flipped model in the 9th grade, the English failure rate dropped from 52 percent to 19 percent; in math, from 44 percent to 13 percent; in science, from 41 percent to 19 percent; and in social studies, from 28 percent to 9 percent. After 2011 the now-flipped school's failure rate dropped from 30 to 10 percent. Graduation rates soared above 90 percent. College attendance went from 63 percent in 2010 to 80 percent in 2012. Results on standardized tests went up in 2012 and then dropped, although complicated by student body changes.[24]

Clintondale teachers found that shorter videos (3–6 minutes) were the most effective for students. The school uses audio files, readings and videos from the Khan Academy, TED and other sources. Students favored the changes. Students unable to watch the videos at home watch the videos in school.[24]

In 2014, MEF University, a non-profit private university located in Istanbul, Turkey, admitted its first students. MEF University is the first university in the world that has adopted the "flipped classroom" educational model university-wide. MEF is a university that keeps entrepreneurship, innovative thinking and creativity in the forefront and has the ability to create global and local value-added with its distinct educational model. In 2016, Emerald published "The Flipped Approach to Higher Education: Designing Universities for Today's Knowledge Economies and Societies".[25] This book was written by MEF University President, Muhammed Sahin, and the Director of the Center for Excellence in Learning and Teaching, Caroline Fell Kurban.

While flipped classroom have proven to be effective in secondary schools for quite some time, recent work has shown that flipped methods could be equally effective in improving student learning at the community college level as well. The flipped classroom model allows faculty to engage students in innovative ways, both inside and outside the classroom, and to employ a range of modern teaching tools and approaches. This proves advantageous for diverse classroom environments with students who have different learning preferences.[26]

On June 27, 2016, Jonathan Bergmann, one of the originators of flipped learning, launched the Flipped Learning Global Initiative, led by Errol St.Clair Smith, Director of Global Development.[27]

**Flipped mastery**[^edit]

In traditional schools, each topic in class receives a fixed amount of time for all students. Flipped mastery classrooms apply a mastery learning model that requires each student to master a topic before moving to the next one.[28]

Mastery learning was briefly popular in the 1920s, and was revived by Benjamin Bloom in 1968. While it is difficult to implement in large, traditional classrooms, it has shown dramatic success in improving student learning.[29][30] The mastery model allows teachers to provide the materials, tools and support for learning while students set goals and manage their time.[28]

Mastery rewards students for displaying competence. Students who initially turn in shoddy work must correct it before moving on. Before flipping, mastery learning was impractical in most schools. It was not possible to give different lectures for different groups of students. Testing was also impractical, because fast-learning students could reveal the test to those who followed.[28]
In a flipped mastery classroom, students view each lecture and work on each exercise or project when they have mastered the precursors. [31]

Tim Kelly, winner of the Presidential Award for Mathematics and Science Teaching, adopted flipped mastery with his colleagues Corey Sullivan and Mike Brust. Sullivan estimated that 40 to 60 hours of work outside school for each of 12 units per course were required the first year. Another Presidential Award winner, Spencer Bean, converted after his daughter went through Kelly's class. [28]

Flipped mastery eliminates two other out-of-class routines: daily lesson planning and grading papers. The latter happens in class and in person. Replacing lectures with group and individual activities increases in-class activity. Every student has something to do throughout the class. In some classes, students choose how to demonstrate mastery—testing, writing, speaking, debating and even designing a related game. Learning Management Systems such as Moodle or ILIAS provide ways to manage the testing process. They create a different test for each student from a pool of questions. Advocates claim that its efficiency allows most students to do a year's work in much less time. Advanced students work on independent projects while slower learners get more personalized instruction. Some students might not get through the year's material, but demonstrated competence on the parts they did complete. [28]

**Limitations and criticisms[edit]**

Critics argue the flipped classroom model has some drawbacks for both students and teachers.

For students, there exists a 'digital divide'. Not all families are from the same socio-economic background, and thus access to computers or video-viewing technology outside of the school environment is not possible for all students. This model of instruction may put undue pressure on some families as they attempt to gain access to videos outside of school hours. [32]

Additionally, some students may struggle due to their developing personal responsibility. In a self-directed, home learning environment students who are not at the developmental stage required to keep on-task with independent learning may fall rapidly behind their peers. [32][33][34]

Others argue that the flipped classroom leads to increased computer time in an era where adolescents already spend too much time in front of computer screens. Inverted models that rely on computerized videos do contribute to this challenge, particularly if videos are long. [32]

Additionally, flipped classrooms that rely on videos to deliver instruction suffer some of the same challenges as traditional classrooms. Students may not learn best by listening to a lecture, and watching instructional videos at home is still representative of a more traditional form of teaching. Critics argue a constructivist approach would be more beneficial. [32]

Teachers may find challenges with this model as well. Increased preparation time is initially likely needed, as creating high quality videos requires teachers to contribute significant time and effort outside of regular teaching responsibilities. [6] Additional funding may also be required to procure training for teachers to navigate computer technologies involved in the successful implementation the inverted model. [2]

The potential performance increase from flipped classrooms has been limited in some cases due to teacher and student unfamiliarity with the classroom setup. Some students do not completely understand the rationale behind flipped the classroom. Also, some students are unfamiliar with the arrangement of this education technique. Both of these things can affect the efficacy of the flipped classroom. [35]

**With other educational approaches[edit]**
- Flipped learning + peer instruction

Interactive method based on collaborative work that has proven effective in areas such as science, technology, engineering and mathematics (Dumont, 2014). Specifically consists of sharing with other students a different response to their own and explain the reasons that support the same to learn from each other. In this process the reasoning beyond the answers is analyzed.

- Flipped mastery learning

When the invested learning model is applied in a more advanced way. Educators begin by organizing content around specific goals. Students work on course content at their own pace and upon reaching the end of each unit, they must show mastery of learning objectives before moving on to the next topic and so on (Bergmann and Sams, 2013). Students can show evidence of their learning through videos, worksheets, experimental stories, programs, projects, examples, among others. There are two challenges in the flipped-mastery model: the first is to deliver instruction to students when they have different levels of learning and understanding of the subjects. The second challenge is to carry out summative assessment when the student has to be evaluated more than once.

- Flipped adaptive learning

The combination of inverted learning and other pedagogical approaches such as adaptive learning can help educators obtain information from the areas of learning that dominate their students and those in which they still have deficiencies or need to improve. This knowledge can support the teacher in determining how to organize and manage class time in order to maximize student learning (Yilmaz-tuzun, 2008). In 2016, NSF funded a study to improve the flipped classroom experience by incorporating adaptive learning (Kaw and Besterfield-Sacre, 2016) [36]

- Flipped learning + gamification

A step forward in the flipped-mastery model would be to include gamification elements in the learning process. Gamification is the application of game mechanisms in situations not directly related to games. The basic idea is to identify what motivates a game and see how it can be applied in the teaching-learning model (in this case it would be Flipped-Mastery). The results of the Fun Theory research showed that fun can significantly change people's behavior in a positive sense, the same effect it has on education (Volkswagen, 2009).

- Flipped learning + cooperative learning

There may also be a symbiosis or complementation between the flipped classroom technique and cooperative learning. Schoolwork, also commonly known as "homework", is done jointly and in cooperation with the group as the teacher moves the time spent explaining the subject to the flipped classroom method. In this way, the student has to assimilate and understand the content of more theoretical weight at home, through the recordings made by the teacher, and the time in class is dedicated to the development of tasks and problem solving and / or doubts through cooperative learning (Fortanet, González, Mira Pastor and López Ramón, 2013).

- Flipped learning + challenge-based learning

**Challenge-based learning** (CBL) is an initiative introduced by Apple for use in higher education. It is a structured model of the course that has a basis in inductive methodological strategies. Instead of presenting students with a problem to solve, the CBL offers general concepts from which students get the challenges they will have to address. In addition, the CBL encourages the use of web and mobile technologies, such as tools and collaborative wikis, which are available to students but are not often used in courses. This model is often interdisciplinary in its approach, and encourages projects that involve the community at large. The combination of allowing students to choose their challenge and linking these challenges to community interaction increases students' investment in a productive outcome. It encourages students to take advantage of the technology they use in their daily lives to solve real-world problems. Its essence is collaborative and requires students to work
with other students, their teachers and experts in their communities around the world to develop a deeper understanding of the subjects they are studying. To assume and solve the challenges, to act, to share their experience, is an important part of its didactic essence and all taking advantage of the ubiquitous possibilities of the technologies in a flipped classroom environment.

- Flipped learning + Inclusive classroom

The qualities of a flipped classroom that are valuable for typical students can also benefits students with disabilities. Inclusive classrooms can be used to change perceptions and reduce the stigma students with disabilities experience. For example, a teacher can develop a lesson about social skills if it was an area of concern for a student diagnosed with Autism Spectrum Disorder. The instructional video would be about social skills and the in-class activities would require team work and collaboration to reinforce the lesson on social skills.

See also[edit]

- Education 3.0
- Jigsaw (teaching technique)
- Learning by teaching
- Massive open online course
- Rotation model of learning

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External links[edit]

- Teaching Tip: The Flipped Classroom - a relatively easy-to-read journal paper about the flipped classroom