

# Edu Trends

Report

OCT 2014



## Flipped Learning

# Table of Contents

- › Introduction:  
Flipped Learning **4**
- › Relevance for the  
Tecnológico de Monterrey **10**
- › Flipped Learning at  
Tecnológico de Monterrey **11**
- › What are other  
institutions doing? **14**
- › Where is this trend heading? **18**
- › A critical point of view **20**
- › Recommended Actions **23**
- › Credits and  
Acknowledgments **25**
- › References **26**



# Flipped Learning

A teaching approach where direct instruction is performed outside the classroom and face-time is used for significant and personalized learning activities.



# Introduction: Flipped Learning

In most university classrooms, a typical scenario has the teacher at the front “lecturing” and writing on the board. The teacher is the central figure in the learning model – the sage on the stage –, while students take notes and are assigned homework at the end of the lesson. The teacher knows or notices that many students did not completely understand the day’s lesson, but lacks sufficient time for meeting with each one individually to address their questions. During the next lesson, the teacher will only gather and briefly review the homework, answer a few questions, but cannot go into much depth since there is a great deal of material to be covered before the final exam (Hamdan, McKnight, McKnight & Arfstrom, 2013, p. 3). This is part of a teacher- centered, traditional teaching model.

Educators around world are trying to change this traditional model – focused on moving through a course curriculum – for one guided by the students’ learning needs. The model that has aroused interest due to its potential is Flipped Learning, a model centered on the student that deliberately consists of transferring part or most of Direct Instruction<sup>1</sup> out of the classroom, in order

<sup>1</sup> Direct Instruction is a teaching model that consists in providing the student with well-developed and carefully planned lessons. These lessons are designed around small increments in learning and clearly defined and prescribed teaching tasks. It is based on the theory that the elimination of bad interpretations can, to a large degree, accelerate and improve learning (NIFDI, 2014).

to take advantage of class time for maximizing one-on-one interactions between teachers and students.

This model’s basic premise is that Direct Instruction is effective when done individually, but given universities’ resources, this would require a much larger faculty team which most institutions would be unable to pay for (Bergmann & Sams, 2014, p. 29). This does not mean that current instruction is necessarily poor: it can be an effective way for acquiring new knowledge; the pace is what is inconvenient. For some students, the pace can be very slow because they already know the contents being reviewed; for others, it can be very fast because they lack the necessary prior knowledge for understanding the concepts (Goodwin & Miller, 2013, p. 78).

In the traditional method, educational content is presented in the classroom and practice activities are assigned for being done at home. Flipped Learning gives a new twist to that method, improving the classroom experience (Fulton, 2014, pp. 3-4) by providing Direct Instruction outside of the classroom time –generally by means of videos. This releases time for more significant learning activities such as: discussions, exercises, laboratories, projects, among others, and also, for fostering collaboration among the students themselves (Pearson, 2013, p. 5).



**Figure 1. Contrast between models centered on the teacher and on the students. Adaptation by Hamdan, McKnight, McKnight and Arfstrom (2013, p. 6).**

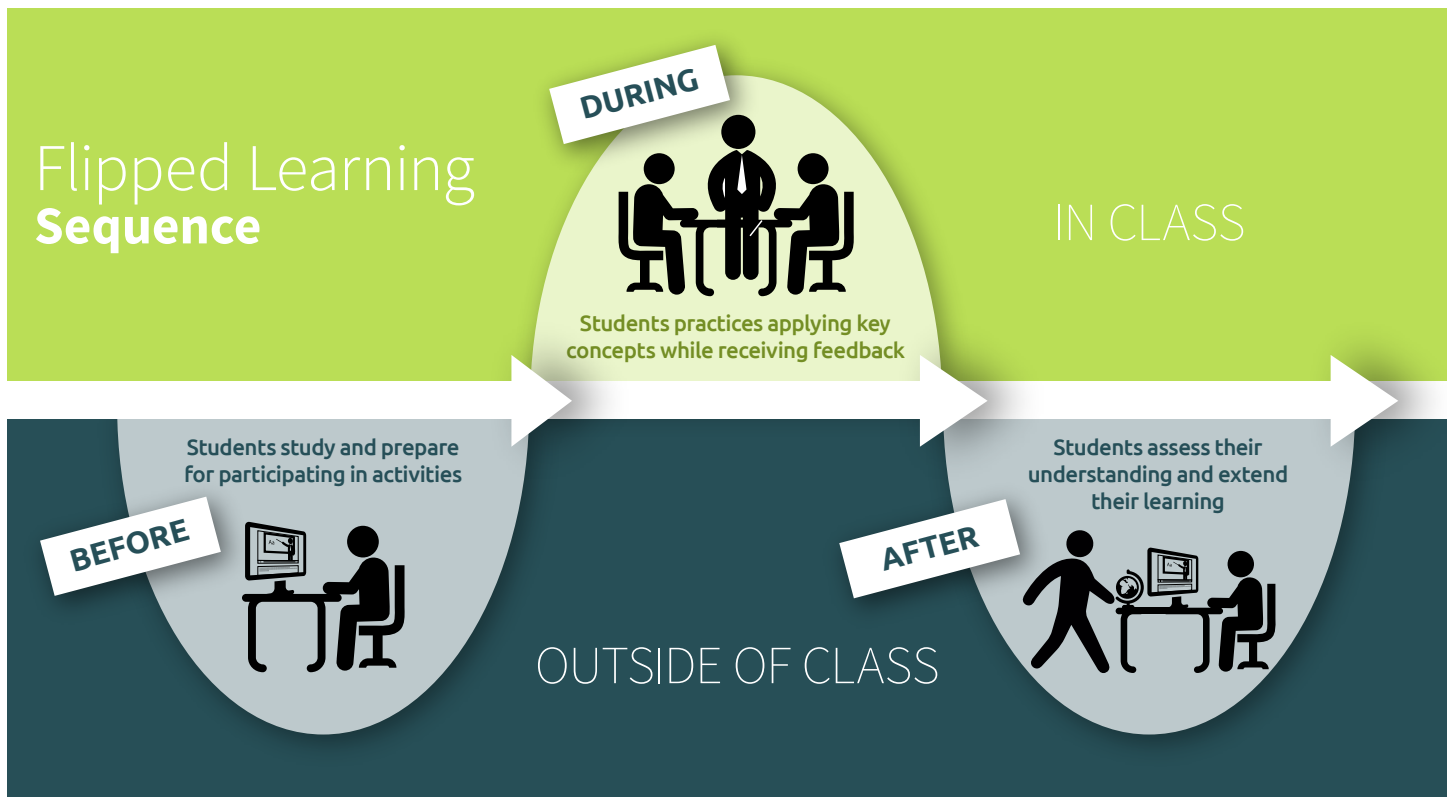


Figure 2. Flipped Learning, typical sequence of learning opportunities, before, during, and after class. Adapted from UT Austin CTL (s.f.).

In this method, the teacher assumes a new role as guide during the students' entire learning process, and is no longer the only source of knowledge. It facilitates learning by means of more personalized attention, as well as challenging activities and experiences that require the development of critical thinking by the students for solving issues in an individual and collaborative manner.

With the aid of one or several technologies, teachers self-record presentations from their computer, create their own videos or choose lessons from Internet sites such as TED-Ed and Khan Academy that refer to the content that they are teaching. As previously mentioned, video is one of the main resources, although other electronic media and resources can be used such as screencasting, digital stories, simulations, ebooks, electronic journals, among others.

Many educators begin to flip their classes by using this type of easily accessed materials so that students can view them when and where it is most convenient for them, and as many times as they require to come to class better prepared. Taking advantage of this prior preparation, faculty can devote more time for implementing active learning strategies with students such as carrying out research or working on team projects. They can also use class time for verifying understanding of subjects with each student, and, if necessary, help them in developing fluency in procedures through individualized support (Musallam

in Hamdan, McKnight, P., McKnight K. & Arfstrom, 2013, p. 4). Integration of technology in learning has always brought a great deal of commotion and expectations due to the changes that innovation can bring. It is important to point out that this instruction model does not consist of a technological change; it only takes advantage of new technologies for offering students with more content options and, most important, redefines class time as an environment centered on the student (Bergmann & Sams, 2013, p. 17).

Another important aspect to highlight is that the pedagogy behind the model is not something new and at first glance it could be argued that by requesting the students to read a text for homework (a common practice by faculty), Flipped Learning is already being implemented. Nevertheless, the potential of this model goes far beyond this simple practice, and the maximization level to be obtained will depend on the implementation made by each teacher.

## Important clarifications

### Flipped Classroom or Flipped Learning?

It could mistakenly be thought that the concepts of Flipped Classroom and Flipped Learning are synonymous and can be used indistinctly, but, it is important to clarify that they are different concepts and their impact on learning can vary considerably.

# Flipped Classroom

Students are assigned texts, videos or additional contents for review outside of class. In this case, classroom time does not necessarily imply a change in the class's dynamic, and so it can or cannot lead to Flipped Learning.

## Flipped Learning

A pedagogical approach that transforms the dynamics of instruction. It is developed in an interactive environment where the teacher guides the students while they apply the concepts and become actively involved in their learning in the classroom. It implies a change towards a student-centered learning culture. This is sometimes called **Flipped Classroom 2.0**.

Figure 3. Differences between Flipped Classroom and Flipped Learning. Built from What's the Difference Between a Flipped Classroom and Flipped Learning? Karl M. Arfstrom, 2014.

### Is not about videos, but everyone talks about that

It's important to clarify that Flipped Learning is not about videos. Bergmann & Sams (2014) have accepted that the frequent misinterpretation of the model is perhaps because they themselves placed a lot of emphasis on the creation of videos. This is the origin of one of the faculty's main concern when implementing this model: Is this about videos?

Flipped Learning is not only about these audiovisual resources, but, the impact that audiovisual materials can have on learning must be recognized; many times, they can be as good as the instructor for explaining concepts, communicating facts or demonstrating procedures. If audiovisual materials are **used creatively**, they can become a powerful expressive tool (JISC Digital Media, 2014). Depending of the subject under review, the resources to be used are chosen to address students' learning styles.

### Neither an antidote nor a panacea

As any educational model or method, Flipped Learning can be implemented wrongly, so it is important to point out that it might not work for all teachers and students, as well as at any level and subject. No all educators will be successful and some students might prefer traditional approaches in the classroom (Hamdan, McKnight, McKnight & Arfstrom, 2013, p. 17).

## Difference with other learning models



### Flipped Learning

Instruction is delivered outside of the classroom by means of videos or other technologies, releasing class time for integrating active learning strategies.



### Online Education

Only provided remotely. Generally, meetings, tasks and activities are delivered online by means of an asynchronous Learning Management System.



### Hybrid Classrooms

Includes online elements, generally during class time. Face to face experiences in sessions vary although they are not necessarily different from what happens in a traditional classroom.

Figure 4. Difference with other learning models: Flipped Learning, Online Education and Hybrid Classrooms.

## Adoption of the trend

In recent years, the popularity of Flipped Learning has increased considerably. Many in the educational community first heard of this concept in the “**Let's use video to reinvent education**” TED talk by Salman Khan in March of 2011. Many others credit Jonathan Bergmann and Aaron Sams as the pioneers of the Flipped Classroom (Driscoll III, 2012, p. 2), who in 2007 began using videos and screencasting applications for recording demonstrations and presentations so that they would not miss classes when attending competitions, sports activities or other academic events (Hamdan, McKnight, McKnight & Arfstrom, 2013, p. 3).





The work of professor Eric Mazur, from Harvard University must also be highlighted, considered to be the source of inspiration due to his great interest in researching technology as an element for motivating and engaging students into taking a more active role in their own learning. The electronic note cards he implemented in his courses led him to explore activities outside the classroom for going deeper into contents; from this he developed the Peer Instruction pedagogy<sup>2</sup> (Fulton, 2014, pp. 6-7).

Outside of the popularization of the concept, the origin Flipped Learning has roots in different pedagogical theories and models. Among them, mention can be made of Active Learning as one of the most important, which is defined as “ The process of having students engage in some activity that forces them to reflect upon ideas and how they are using those ideas” ( Michael in Hamdan, McKnight, McKnight and Arfstrom, 2013, pp. 6-7). Emphasis is placed on maximizing one-on-one interactions, and involving the students more actively.

Jonathan Bergmann and Aaron Sams have driven the adoption of this trend. At the beginning of 2012, they started up the non-profit [Flipped Learning Network \(FLN\)](#) organization, for providing educators with the knowledge, skills and resources for successfully implementing the Flipped Learning model.

Before FLN, they began with an online community called Flipped Learning Ning (also known as Ning), a free site web for faculty that have flipped or want to flip their classrooms. It was created by the Mathematics and Science Teaching Institute at the University of Northern Colorado and maintained by Jerry Overmyer. In January 2012 there were 2500 members in the Ning and by March 2013 they had 12 000 educators registered (Hamdan, McKnight, McKnight & Arfstrom,

<sup>2</sup> Student-centered pedagogy based on research developed by professor Eric Mazur, in the 1990 decades at Harvard University. Students come to class and interact with their colleagues and teachers in applying their learnings from activities prior to the class (Schell, 2014).

2013, p. 3). As of these initiatives, Bergmann and Sams became the leaders of Flipped Learning.

Up to now, there is no basis of scientific research that allows to state how well Flipped Learning is working in institutions, but preliminary data<sup>3</sup> provided by the FLN, as well as cases such as that of the Clintondale Michigan High School, suggest that this model can provide potential benefits (Goodwin & Miller, 2013, p. 78). Also, there is no recipe or template for implementing Flipped Learning, in most courses, as mentioned, educational content is captured in video format; many teachers produce their own content or complement it with videos by other teachers or entertainment sources that support the study objective.

Flipped Learning is being applied in classrooms from the kindergarten level up to universities; it is also beginning to be adopted in the corporate training and professional development environments. It is expected that interest in this trend will continue to grow as technologies and bandwidth become more accessible and integration of technology in learning increases. Further on, some of the most relevant implementation cases of Flipped Learning in different educational institutions are discussed.

## Key Elements

There currently is no unique guide for implementing Flipped Learning; rigorous qualitative and quantitative research on this method of instruction is required. Considering this, an experienced group in the Flipped Learning Network (FLN), jointly with the Pearson School Achievement Services, in 2013 performed a trend analysis that allowed the identification of the four pillars that make Flipped Learning possible.

<sup>3</sup> In a poll to 453 teachers, 67 percent reported an increase in scores, with particular benefits for special needs students and in those in an advanced class; 80 percent reported improvement in the attitudes of students; and 99 percent said that they would continue to implement Flipped Learning the following year. In Clintondale High School in Michigan there was a drop in failure rate in ninth grade mathematics from 44 to 13 percent (Goodwin & Miller, 2013, p. 78).





# 4 Key Elements in FLIPPED LEARNING

## 1 Flexible Environments

Students can choose when and where they learn; this gives greater flexibility to their expectations in the learning rhythm. Teachers allow and accept the chaos that can happen during the class. Appropriate assessments that significantly measure understanding for students and teachers are established.

## 2 Learning Culture

A change is seen in the learning approach from a teacher-centered model to a student-centered one. Classroom time is used for going deeper into subjects, creating more enriching learning opportunities and maximizing face-to-face interactions for ensuring understanding and synthesis of the material.

## 3 Intentional Content

When developing an appropriate instructional design, the teacher has to analyze: what content can be taught in the classroom and what materials will be made available to the students so that they can explore by themselves? Answering this is important for integrating learning strategies or methods in accordance with the grade and subject, such as based on problems, mastery learning, Socratic method, among others.

## 4 Professional Faculty

In this model, qualified teachers are more important than ever. They must define what and how to change instruction, as well as to identify how to maximize face-to-face time. During the class, they must observe and provide immediate feedback, as well as continuously assess students' work.

Figure 5. The four pillars of Flipped Learning per FLN. Adapted from Hamdan, McKnight, McKnight & Arfstrom, 2013.



# The **BIG** Questions

How does it **Works**, how to take advantage of **classroom time**, do I need to make videos...



## **Does Flipped Learning work? Do all faculty need to implement it?**

More than stating if it works or not, it is better to ask: how to exploit the benefits of the model? Before “flipping” something, enough time must be devoted for researching and identifying what could work best for each specific class (Gorman, 2012). The more didactic courses, those with a great deal of content at the extreme lower side of Bloom’s taxonomy – remembering or understanding categories –, are the ones that will probably reap greater benefit with this model (Bergmann & Sams, 2013, p. 16).

## **How does it work? All I have to do is make videos?**

As previously mentioned, Flipped Learning is not about how to use videos of the courses, but rather how to best use classroom time with students (Bergmann & Sams, 2013, p. 16). Also, it must be considered that explanations or Direct Instruction are not the only thing teachers can flip, they can also remove other activities such as assessments or practice exercises from the learning space.

## **If I’m not “teaching the course”, then what is my role in the classroom?**

The teacher remains the conductor in this model. Flipped Learning implies a great task in redesigning materials, activities, assessments, etc. and rethinking about how to effectively use learning space in the classroom. This is why a professional educator is required to define what and how change instruction, and maximize face-to-face time with their students. The teacher moves from being the sage on the stage to the guide on the side (King, 1993, p. 30).

## **How can I make better use of time with my students in the classroom?**

The main reflection must be on two questions:

- In what part of the learning cycle is face-to-face time more necessary for students: during the explanation or when they try to understand and apply the knowledge?
- With the use of technology, ¿what part of instruction can I send outside the classroom so as to increase the value of face-to-face time?

The teacher must assess the contents of the subject, the performance of students and take into account the obtained results from the assessment to determine how to implement Flipped Learning.

## **How to ensure that students view the contents? What do I do if they do not and show up unprepared to class?**

It is possible to gather relevant data on students’ interactions with the materials to be reviewed (most content delivery platforms do so); data so detailed that teachers can use it in preparing their next lesson and differentiate instruction where necessary. There are also other tools such as the [WSQ model](#) developed by professor [Crystal Kirch](#), which organizes contents and materials, keeps a record of the materials that students are viewing, provides structured time for discerning each instruction, gathers feedback given by the students, and also prepares and facilitates the discussion that will be held during the class.

# Relevance for the Tecnológico de Monterrey

The Flipped Learning proposal fully integrates into the objectives of the institution's TEC21 Model. By flipping learning, the classroom can become an ideal space for developing challenging and interactive learning experiences. Teachers can devote more time to more enriching and significant activities. Students can get more involved practices, debates, exercises or activities, which allows an assessment of direct learning while they are applying what they've learned. By implementing this model, students leave class with a level of clarity and a sense of achievement that is difficult to obtain with the formats used in traditional classes (Wroblewski in Kaufman, 2014). The speed in which they receive feedback when ideas are still fresh in their minds, is one of the major benefits of the model and from other active learning approaches.



To adapt to this new model, the teacher needs to develop new skills in the use of technologies, generate educational materials in different electronic media and maximize class time. By transferring instruction outside of class, students will have access to contents in a more flexible manner, since the course can be taught by means of different electronic media such as screencasting, slidecasting, video lectures, digital stories, and simulations; additionally, resources available in the institution's digital databases can be used, such as ebooks, electronic journals, newsfeeds and printed content (Valenza, 2012).

In many cases, when this model is appropriately implemented it can become more effective than the traditional instruction model (Morgan, 2014). The faculty of the Tecnológico de Monterrey have obtained evidence that students learn more actively in comparison with the conventional lecture method; they participate with greater commitment and interest during the class, go into greater depth in the contents, and they can even achieve more significant learning as relates to their particular

needs. In general, those teachers that have more experience in the implementation find greater potential for personalization and differentiation of instruction when the contents are on an online platform and class time is used for supporting students as they move forward in achieving mastery over the contents (mastery learning) at their own rhythm (Wiginton, 2013). Studies show that, when mastery learning is appropriately implemented, almost 80 percent of all students in the class can learn the most important concepts, compared with 20 percent of students that achieve this in the traditional model (Bergmann & Sams 2012).

In the Educational Report (2011), Bergmann highlights the benefits that the Flipped Learning can provide for students, among the most cited are:

- Learning to learn on their own.
- Identify the manner in which they learn best.
- They collaborate and help each other.
- They have more time for interacting with the teacher and resolving their doubts in practice.
- They are more involved in their own learning.
- Improve their critical thinking.
- Improve their performance.

Likewise, he highlights the benefits for teachers when applying this model (Bergmann, 2014):

- Devote more time to interacting with the students.
- Increase the motivation of their students.
- Bring about the creation of a trust relationship.
- Aid in improving students' performance.
- They provide formative and summative feedback.
- Can differentiate contents for the needs of each student since they no longer lecture or present a conference during the entire class.

Implementation of Flipped Learning can drive the transformation of "new teachers": in the Tecnológico de Monterrey, teachers who are inspiring, cutting edge and innovative in their practice, willing to face new challenges that motivate them to critically assess their own practice and adjust or modify it to satisfy the needs of the students (Stumpfenhorst, 2012). An important factor for achieving successful implementation will be for teachers to participate in the identification and dissemination of best practices with the purpose of sharing ideas and experiences, as well as connecting with more teachers in a collaborative and learning network (LaFEE, 2013).

# Flipped Learning at Tecnológico de Monterrey

To date, at least 72 faculty of the Tecnológico de Monterrey have implemented the Flipped Learning model, reaching around 6000 students in different courses and grades between August 2013 and August 2014. The following is a list of the outcomes and experiences from some of these teachers.

**David Peña** ■  
[david.zenteno@itesm.mx](mailto:david.zenteno@itesm.mx)  
Chiapas Campus

**Course:** Human Relations  
**Subjects:** the entire course  
**Semester:** 3.<sup>rd</sup>

▲ Helps to build learning in a different way. Students, after watching the videos at home, come to the classroom with prior knowledge, bringing work and discussion to a higher level; students become more participative and not only recipients.

**Angélica Santana** ■  
[angelica.santana@itesm.mx](mailto:angelica.santana@itesm.mx)  
Chihuahua Campus

**Course:** International outlook, Geopolitics, Regional scenarios, History of Mexico and Economics and State

**Subjects:** International actors in regional scenarios, history of Spanish conquest in Mexico

**Semester:** 3.<sup>rd</sup> to 5.<sup>th</sup>

▲ The 4 Cs strategy was integrated into the courses: Connection, Concept, Concretion and Conclusion.  
▲ This model, along with the 4 Cs, allows to teacher to really take advantage of the time they have with the students in class for validating their learning.

**Gilberto Huesca** ■  
[ghjuarez@itesm.mx](mailto:ghjuarez@itesm.mx)  
Mexico City Campus

**Course:** Fundamentals of programming  
**Subjects:** the entire course  
**Semester:** 1.<sup>st</sup>

▲ The effort and time dedicated by the teacher to making videos is greater than in the traditional method, but this is rewarded in the implementation because the teacher has more time for challenging and significant exercises in the class.

▲ Also, the students themselves point out that they develop pragmatic and self-management skills.

▲ It is worthwhile to highlight that when analyzing exam data, results show that

learning gains of a traditional class and one with Flipped Learning are similar, which could indicate that the two are similarly effective.

**Agustín Vázquez** ■  
[avs@itesm.mx](mailto:avs@itesm.mx)  
State of de Mexico Campus

**Course:** Fundamental of Life  
**Subjects:** the entire course  
**Semester:** 1.<sup>st</sup>

▲ The students handle the concepts and discussion at the level required by the subject. During the class, concepts are not repetitively reviewed because the students know where to consult them and expand their knowledge if they consider it necessary. As the subject is developed, students understand the importance of mastering the subject's basic concepts and link them with others.

**Kenneth Bauer** ■  
[kenbauer@itesm.mx](mailto:kenbauer@itesm.mx)  
Guadalajara Campus

**Course:** Fundamentals of programming and Solution of programming issues

**Subjects:** the entire course

**Semesters:** 1.<sup>st</sup> and 2.<sup>nd</sup>

▲ With Flipped Learning, the teacher can dedicate more time in the classroom to supporting each student individually. Also, the teacher has greater availability for advising them

outside the classroom during office hours and through social networks.



**Rosa Brito** ■  
Guadalajara Campus

**Course:** Contemporary art and society and Direction and staging

**Subjects:** the most complex or the broader theoretical ones

**Semesters:** 2.<sup>nd</sup>, 5.<sup>th</sup> and 7.<sup>th</sup>

▲ There is greater involvement by students in their own learning, even discussing the subjects among themselves. On the other hand, the teacher has more time for interacting with students during activities where knowledge is applied or reinforced; also, teaching can be personalized according to their different learning rhythms and styles.





**Arturo Alonso** ■  
[lng.maaz@itesm.mx](mailto:lng.maaz@itesm.mx)  
Guadalajara Campus

**Course:** Engineering in construction  
**Subjects:** the entire course  
**Semester:** 8.<sup>th</sup>  
▲ By implementing the model, questions from students become deeper and more reflexive after doing team dynamics. They appreciate that their colleagues contribute and clarify their doubts and that the teacher expands the subject with his experience. It is important to clearly define what is expected from the activity: the guideline must demand participation and contribution to each subject; it is a way of ensuring reading the material and the quality of the debate.

**David Schaeling** ■  
[david.sch@itesm.mx](mailto:david.sch@itesm.mx)  
Guadalajara Campus

**Course:** German, levels 1 to 6  
**Subject:** Grammar  
**Semester:** several  
▲ It is evident that students are more prepared when they attend class since they apply their learnings through practical exercises. At the same time, the teacher has more time for working with students with particular doubts or difficulties with the subjects.



**Katherine Sutton** ■  
[ksutton@itesm.mx](mailto:ksutton@itesm.mx)  
Guadalajara Campus

**Course:** Analysis and verbal expression in English  
**Subjects:** individual and collaborative activities that use deductive, inductive or analogical reasoning  
**Semester:** 1.<sup>st</sup>  
▲ The students learn in a much more active and practical manner that when the course is taught with the conventional lecture method.  
▲ The relationship with students is more personalized. By detecting

their understanding, strengths and needs, we can support students with suggestions and feedback on the application of their knowledge.

**Misael Caballero** ■  
[misael.caballero@itesm.mx](mailto:misael.caballero@itesm.mx)  
Guadalajara Campus

**Course:** Historical fundamentals in health sciences  
**Subjects:** Contributions of culture, medical knowledge, transcendence and current affairs  
**Semester:** 1.<sup>st</sup>, 3.<sup>rd</sup> and 5.<sup>th</sup>  
▲ The model allows and facilitates interaction with students in class. The teacher can support them in clarifying their doubts and questions, support them in their learning and ensuring level knowledge within the group.

**Karla Gámez** ■  
[karla.gamez@itesm.mx](mailto:karla.gamez@itesm.mx)  
León Campus

**Course:** Optimization Models  
**Subjects:** Mathematical modeling for problems in operations research, resolution by means of tabular simplex method and artificial variables method  
**Semester:** 5.<sup>th</sup> and 6.<sup>th</sup>  
▲ There is active participation by students in class, because they know that they come to the classroom not only to listen to the teacher, but to perform activities derived from information reviewed in prior tasks and activities. This has reduced the number of hours of explanation and has given greater time for analysis of cases and practical exercises.

**Noel Hernández** ■  
[noel.hernandez@itesm.mx](mailto:noel.hernandez@itesm.mx)  
León Campus

**Course:** Introduction to computing  
**Subjects:** Introduction to flow charts with RAPTOR  
**Semester:** 1.<sup>o</sup>  
▲ There is better use of class time for activities that expand knowledge. Information that does not add value beyond instruction can remain in video.

**Gabriela Flores** ■  
[gabriela.flores.alcocer@itesm.mx](mailto:gabriela.flores.alcocer@itesm.mx)  
León Campus

**Course:** Fundamental of writing, Analysis and verbal expression, Ethics, person and society and Ethics, person

and citizenship  
**Subjects:** Specific to each subject  
**Semester:** 1.<sup>st</sup> and 9.<sup>th</sup>  
▲ The Flipped Classroom is an educational strategy that aids in achieving significant learning, since the students themselves are responsible for their own educational process. It allows going deeper into subjects, while the teacher can focus on activities that develop greater value for the student.



**Elizabeth Mena** ■  
[elizabeth.mena@itesm.mx](mailto:elizabeth.mena@itesm.mx)  
León Campus

**Course:** Mathematics 5  
**Subjects:** Limits and calculation of higher order derived limits  
**Semester:** 5.<sup>th</sup> in Bilingual Senior High School  
▲ This model gave great dynamism to the sessions. It generated enthusiasm in most students, although some were never able to adapt to the new style. What stands out most is self-recognition by students of their capability for understanding and explaining a mathematical subject. They assume responsibility and commitment for their learning and become aware that effort and hard work bring them great satisfaction at the end of the course.

**Francisco Ayala** ■  
[fayala@itesm.mx](mailto:fayala@itesm.mx)  
Monterrey Campus

**Course:** Psychopathology  
**Subjects:** Differential Diagnosis  
**Semester:** 4.<sup>th</sup> and 5.<sup>th</sup>  
▲ The involvement of the students with the contents is greater, they appear more interested and go into greater depth in the subjects. During Direct Instruction, they analyze the videos of cases and conferences, and respond to a series of questions on the subjects viewed. Afterwards in the live class we look at the cases and issues to be resolved where they apply what they've learned.



## Mónica Delgado

[monica.delgado@itesm.mx](mailto:monica.delgado@itesm.mx)

Monterrey Campus

**Course:** Climate change and energy use

**Subjects:** Carbon Capture and Storage

**Semester:** 1.<sup>st</sup> and 3.<sup>rd</sup>

▲ This model allows students to have prior knowledge of the subject and come to classroom more prepared. There is a better understanding of the subject because the contents are reviewed with more detail during class and the students have the opportunity for resolving their doubts with a deeper analysis. Additionally, this is a big challenge for the teacher when students come to class better prepared because teachers must guide them in building their knowledge and learning.

## Darinka Ramírez

[darinka@itesm.mx](mailto:darinka@itesm.mx)

Campus Monterrey

**Course:** Balance of material

**Subjects:** the entire course

**Semester:** 2.<sup>nd</sup>, 3.<sup>rd</sup> and 4.<sup>th</sup>

▲ By using short videos with a maximum five minutes they can be watched as many times as necessary, allowing students to reinforce concepts and procedures. Additionally, this allows them to move forward on the subjects if they want to. This model favors learning, nevertheless, it must be applied moderately and with pertinence in accordance with the learning to be obtained.

## Rodrigo Ponce

[rponce@itesm.mx](mailto:rponce@itesm.mx)

Eugenio Garza Lagüera Campus

**Course:** Energy, Modern physics II, Energy and movement

**Subjects:** Parabolic shots or projectile launches, generation of wind energy and the entire course on Energy and movement.

**Semester** 4.<sup>th</sup> to 6.<sup>th</sup> of Senior High School

▲ Time is better used for working in the classroom. Theory (concepts and equations) is studied in five to ten minute videos, while in class, they practice solving problems.

## Rocío Gómez Tagle

[rgomeztagle@itesm.mx](mailto:rgomeztagle@itesm.mx)

EGADE Monterrey

**Course:** Integrating seminar and Fundamentals of Finance

**Subjects:** the entire course

**Quarter:** 2.<sup>nd</sup> and 5.<sup>th</sup> of MAF

▲ Before introducing postgraduate students to the Flipped Classroom format, it is important to advise them of this change and introduce them little by little to the model. Since the students have used the traditional model in their undergraduate courses, they are not accustomed to this model, so it is not recommended that all sessions are flipped. At the end of the course it's important to poll the students about their learning experiences and what they liked and didn't like.

## Elena García

[elena.garcia@itesm.mx](mailto:elena.garcia@itesm.mx)

Puebla Campus

**Course:** Incubation II, Market intelligence seminar, Technology and

Marketing, Marketing and Creativity

**Subjects:** several

**Semester:** 1.<sup>st</sup>, 2.<sup>nd</sup>, 3.<sup>rd</sup>, 8.<sup>th</sup> and 9.<sup>th</sup>

▲ With this method, the quality of the class improves since students arrive prepared and the dynamic of session is faster and more pleasant. It is a more appropriate way for achieving authentic learning.

## Ignacio Cabral

[icabral@itesm.mx](mailto:icabral@itesm.mx)

Puebla Campus

**Course:** Information Technology for business

**Subjects:** Beginning of each subject in the course

**Semester:** 1.<sup>st</sup>

▲ Close to 70 percent of students were comfortable with this model, but around 30 percent were unable to become accustomed to working like this and preferred to continue with the Traditional Method. It is an instruction technique that invites students to study the subjects ahead of time. Class time is no longer invested in explaining concepts that they can acquire on their own. Class time can be devoted to other activities or to programming exercises.

## Reyna Martínez

[reyna.martinez@itesm.mx](mailto:reyna.martinez@itesm.mx)

Toluca Campus

**Course:** Mathematics III

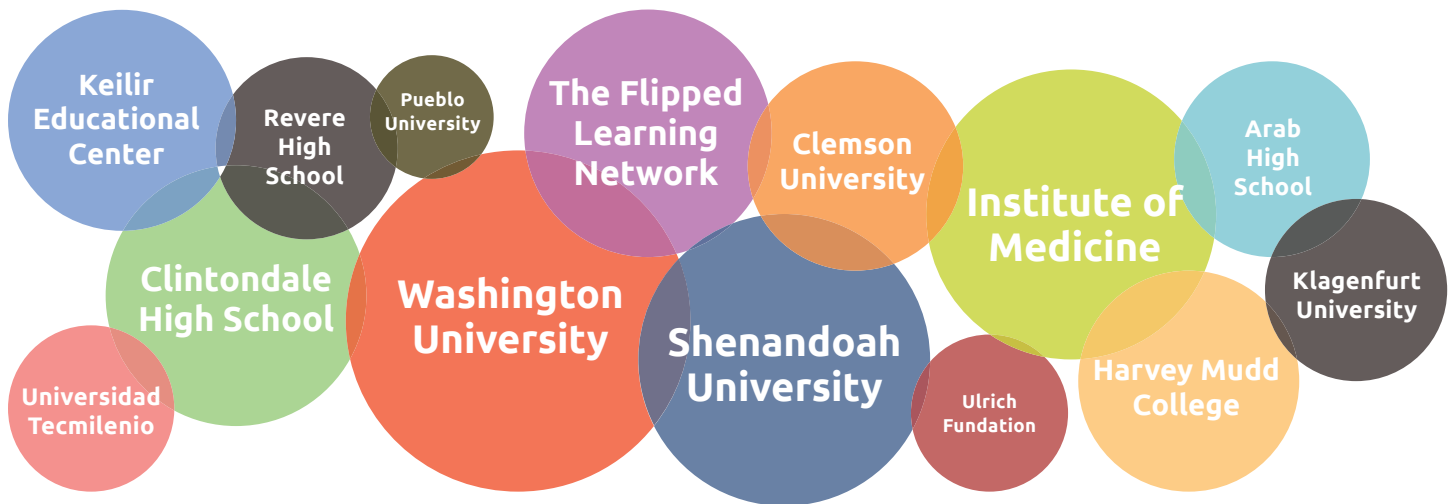
**Subjects:** the entire course

**Semester:** 3.<sup>rd</sup> and 6.<sup>th</sup>

▲ Students assume greater responsibility about their learning and, also have more flexibility for viewing the contents outside of class as many times as necessary. In class, there is close interaction between students and teacher, especially with those that need greater guidance with the contents. Additionally, the educator has more time for students to perform activities relevant to their learning.



# What are other institutions doing?



**2010**

## **Keilir Educational Center**

In 2010, the [Keilir Educational Center](#) in Iceland implemented this model. The performance of their students increased, achieving the highest scores in the country's state exam (James 2013). This school prepares students that have professional training or sufficient practical experience in the industry for realizing new studies at the university level. Iceland could be the first country in the world to completely change its entire educational model to Flipped Learning (Bergmann 2012).

**2011**

## **Clintondale High School**

In September 2011, the [Clintondale High School](#) implemented the Flipped Learning model in all their programs and have achieved a reduction in the percentage of failure in their classes: 33 percent in English, 31 in Mathematics, 22 in Sciences and 19 in Social Studies (Green, 2012). Additionally, students performance in standardized tests increased globally, and additionally, disciplinary issues with students fell by 66 percent (LaFEE, 2013).

## **Clemson University**

In 2011, [Clemson University](#) implemented Flipped Learning in the Health Sciences specialty. It was observed that this generation of students developed a very different manner of studying and thinking with respect to previous students. Implementation was done in three stages: in the first, they recorded courses in the classroom and 24/7 access was provided to these; in the second, they recorded courses previously and requested that students study them before discussing them in the classroom; in the third, briefer and more specific video conferences were held, fostering more attractive discussions in class. The approach continued evolving based on feedback from students and as result of this change, discussions in class were more enriching (Shumski, 2014).





## University of Washington

In 2012, the [University of Washington](#) implemented the Flipped Learning model for introductory Biology. At the end of the course, the percentage of failing students dropped from 17 to 4 percent, while that the number of students with a grade of excellence increased from 14 to a 24 percent. With this model, students commented that they had more opportunity for practice activities that would serve them in preparation for exams (Long, 2014).

## Revere High School

In 2012, at the [Revere High School](#), Flipped Learning was implemented in all their courses, achieving a 2,1 percent reduction in the number of students failing and increased attendance to 95 percent. In two years they went from being a low performing school to classify for silver rating in the [Ranking U.S. News and World Report High Schools](#). They were also recognized with the “Transformation Award” granted by the Department of Education of the State of Massachusetts (Donohue, 2014).

## The Flipped Learning Network (FLN)

In 2012, [The Flipped Learning Network](#) surveyed 453 educators that belong to this network: 67 percent of faculty reported that students’ performance in exams increased; 80 percent considered that their students’ attitude towards learning was improved. On the other hand, 88 percent stated that they feel more satisfied with their work using this model and 99 percent said that they would implement it again the following year (Valenza 2012).

## Boston University School of Engineering

In 2012 in the [Boston University School of Engineering](#), professor Lorena Barba implemented the Flipped Learning model. From her experience she highlighted that classroom time is no longer used for lecturing, but rather for having work stations and solving problems. By means of this model, students solved problems with a collaborative approach in the classroom, which was made possible because they had already reviewed the learning videos outside the class Flipping the instruction has improved the result of presentations by students (Shumski, 2014).

## Shenandoah University

In April of 2012, the [Shenandoah University](#) implemented the Flipped Learning model in pharmaceutical education. In the module on renal pharmacology, class time that was normally used for taking notes was replaced with highly interactive learning activities with the instructor (such as simulations). Prior to the class, students accessed videos and podcasts of the lecture and took exams for measuring their retention of knowledge. The students’ performance was significantly greater than the previous year and the students’ experience was positive (Pierce & Fox, 2014).

## Institute of Medicine (IOM)

In 2012, a study was performed on the implementation of Flipped Learning in the [Institute of Medicine \(IOM\)](#) in the United States seeking to bridge the gap between didactical education and the clinical practice that students need in the anesthesia nursing programs. The outcomes showed that some students considered the model to be useful, but indicated that it requires more work than the traditional class format. Others considered that online content was the same as in the classroom (Hawks, 2014).

## Harvey Mudd College

In 2012, faculty from the mathematics and engineering areas of [Harvey Mudd College](#) undertook a three year study on the effectiveness of Flipped Learning. The hypothesis they wanted to prove is that this model can additional advantages in the students learning such as: increase the capability in the use of learned materials, interest and aptitudes in science, technology, engineering and mathematics, as well as generating awareness as to how students learn (Raths, 2014).

During 2013, in the [University of Klagenfurt](#) in Austria, experiments were made with the Flipped Classroom model in the course on introduction to SCRUM methodology in the software development engineering major. The outcomes showed that interaction in class, collaboration and critical thinking of students improved. 85,8 percent of the students found the model to be interesting and they had a sense of achievement from having completed the practices and activities. Group discussions in the classroom were more efficacious as they improved their knowledge on how to use the model (Pang Nai Kiat, Yap Tat Kwong, 2014).

### Ulrich Foundation

In 2013 by means of the [NextGenU.org](#) platform, the Ulrich Foundation and Ruth Frank for International Health along with faculty from the British Columbia University, Waterloo University, and the Simon Fraser University performed a study on the implementation of Flipped Learning in public health higher education. Outcomes showed that, in comparison with the traditional model, students attained higher scores in exams; students in the traditional model obtained an average of 86,4 percent in 2011 while the ones in Flipped Learning obtained 88.8 percent in 2013 and reported a perception of having acquired more knowledge. The surveys and focus groups revealed two factors that positively influenced the learning experience: 1) interaction with other students and with the instructor and 2) change to an attitude of greater interest in the health area (Galway, Corbett, Takaro, Tairyan & Frank 2014).

### Colorado State Pueblo-University

In 2013 at the [Colorado State Pueblo-University](#) they implemented the model in the History of the World class. 72 percent of the students stated that consulting the videos prior to class helped them be prepared for the debates and exercises that were done in class. 80 percent pointed out that at the end of the course they had learned a great deal concepts and information with respect to the subjects covered in class. The teacher of the course considers that this model allowed her to conduct intellectual discussions and debates with better prepared and more active students. (Gaughan, 2014).

### Arab High School

In 2013, the [Arab High School](#) in Alabama found that, as a result of applying the Flipped Learning model for the subjects of magnetism and electrostatics in the physics course, students appeared to be more committed and participative in class. The general performance of the group rose from 84 to 89 and the students themselves considered that they learned more. The course focused on resolving the students' difficulties and not on what the teacher wanted to show (Lawrence, 2014).

### Tecmilenio University

Since 2013, the [Tecmilenio University](#) implemented Flipped Learning with the objective of aiding undergraduate and senior high school students in attaining their maximum potential in a challenging learning environment. By the summer of 2014, 211 courses had been adapted to this modality, which represents 31% of the total of their courses (674) impacting more than 10 thousand undergraduate students and more than 12 thousand in senior high school. Currently 1,952 faculty have been trained in Flipped Learning. According to Jon Bergmann this is “**The largest implementation of Flipped Learning in the world**” (Gutiérrez, 2014).

The implementation of Flipped Learning from January through May of 2014 brought an increase in the satisfaction of students with respect to the traditional model from January through May of 2013: in undergraduates it increased from 81.7% to 89.0 % and in senior high school it increased from 86.2% to 87.8%.

As a result of this experience, the Tecmilenio University is considering the following actions:

- Integrate Flipped Learning as the basis of all its courses
- Adapt all their training materials for teachers and contents for students
- Perform research on this model as a learning tool

Luis Gutiérrez Aladro | [luis.gutierrez@tecmilenio.mx](mailto:luis.gutierrez@tecmilenio.mx)

Vice rector of Academic Innovation and Development | Tecmilenio University

## Flipped Learning

211

Courses  
adapted

1,952

Faculty  
trained

+10 k

Undergraduate  
students

+12 k

Senior high  
school students

**“The largest  
implementation  
of Flipped  
Learning in the  
world**

**Jon Bergmann**

October 2014

# Where is this trend heading?



Today's technology is redefining tomorrow's classrooms, and online Education is helping this transformation. As long as more students have access to computers and mobile devices connected to the Internet, more interactive educational opportunities will open up for faculty and students (Devaney, 2014). For example, debates and experiences about Flipped Learning have increased due to the availability of contents of the MOOC (Gartner, 2013); which will continue to expand access to quality higher education at a very low or null cost. Even in higher education, the model begins to be very popular due to the manner in which one-on-one instruction with students is reorganized, as well as managing class time in a more efficient and enriching manner (NMC, 2014).

The traditional role of the teacher will also continue evolving. Eric Mazur points out that lecturing, as the main vehicle for teaching is now an obsolete approach (CockrumVideos, 2013). Likewise, professor Arturo Alonso in the Tecnológico de Monterrey considers that faculty can no longer be only lecturers, but rather they must be guides for students in the learning process. This change in their role will demand greater emotional intelligence and preparation by the faculty due to the closer dealings they will have with each student. Additionally, they will have to develop skills in the use of new technologies for generating educational materials in different electronic media and at the same time, search for ways for motivating their students for using this technology.

This model is part of a broader pedagogical movement that coincides with others such as Hybrid Learning. Research Based Learning and other pedagogical approaches and tools that seek to be more attractive, active and flexible for students (NMC, 2013). The following is a list of trends in the integration of Flipped Learning with other educational approaches.

## *Flipped Learning + Peer Instruction*



An alternative approach for helping students to learn is the combination of the Flipped Learning model with Peer Instruction. The last is an interactive method based on collaborative work that has demonstrated effectiveness in areas such as science, technology, engineering and mathematics (Dumont, 2014).

The inclusion of Peer Instruction in the Flipped Learning model is another way of involving students in class activities. This is a technique for helping them to make sense of the information by means of teaching and the questioning. It consists of sharing a response different from one's own with other students and explaining the reasons that support it so as to learn from each other. In this process, reasoning is analyzed more than the responses. In some cases, explanations from the students themselves to their peers can turn out to be clearer and more enriching than those of the teachers (Mazur, 2013).

## *Flipped Mastery Learning*



When the Flipped Learning model is applied in a more advanced manner and knowledge is to be taken to the next level, it is known as the flipped-mastery model for education. In this case, educators begin by organizing the contents around specific objectives. Students work on the contents of the course at their own pace and, when they complete each unit, they must show domain of the learning objectives before moving through to the next subject and so on (Bergmann & Sams, 2013). The students can show evidence of their learning by means of videos, worksheets, experimental logs, programs, projects, examples, among others. These evidences differ depending on the learning area of the class.

There are two challenges in the flipped-mastery model: one is to deliver instruction to students when they have different learning levels and comprehension of the subjects. The other is to perform summative assessment when the student must be assessed more than once.

The flipped-mastery model allows innovating within the classroom, as well as maintaining the integrity of the standards of the contents. Also, advantage can be taken

of technology for overcoming logistics obstacles. This allows teachers to individualize and focus learning for each student.

### *Flipped Adaptive Learning*



The combination of Flipped Learning and other pedagogical approaches such as Adaptive Learning can help educators to obtain information about the areas of learning already mastered by their students and those where they still have to improve. This knowledge can support the teacher in determining how to organize and manage class time, maximizing the learning by the students (Yilmaz-tuzun, 2008).

In a Flipped Learning environment, students complete a certain level of knowledge through some type of homework before coming to class; thus, the teacher can dedicate valuable time to more complex aspects or performing high level exercises. For a Flipped Learning environment to be more effective, the instructor must know where the students are in relation to the contents and how well they master them before beginning a subject (Windelspecht, 2014). With the use of Adaptive Learning and Assessment Platforms, students' answers can be monitored and analyzed. The teacher can identify with greater precision if they understood the subjects or not, in such a way that they can offer direct guidance to those who need it (Kerns, 2013).

Additionally, Adaptive Learning Platforms can support the teacher in finding out what subjects require the development of learning resources that help students in their learning. Valuable data can also be provided on students' assessments personalized reports can be generated on the students' performance in different subjects. This combination of pedagogical approaches can result in a more attractive and personalized learning experience for students (Windelspecht, 2014).

### *Flipped Learning + Gamification*



A further step in the Flipped-Mastery model would be to include elements of Gamification in the learning process. Gamification is the application of gaming mechanisms in situations not directly related with games. The basic idea is to identify what makes a game motivating and how this can be applied in the teaching-learning model (in this case it would be Flipped-Mastery). The outcomes from Fun Theory research demonstrated that fun can considerably change people's behavior in a positive sense, the same effect that it has in education (Volkswagen, 2009).

Sometimes students can be fearful of having poor performance in a task or assessment, but gamification along with a low risk of failure can support the Mastery Learning model and reduce students' fear of "failing". To create a culture with a very low level of risk of failing, it is important to motivate students to try and test, and celebrate their attempts avoiding to record everything in the grade card (Petty, 2013).

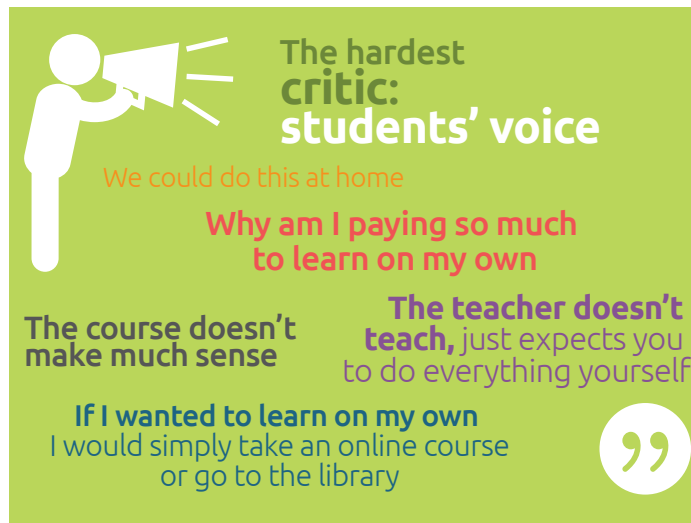
"When introducing gamification it is recommended to offer different options to students for achieving the learning objectives, allowing them to take different paths to explore different levels in Bloom's taxonomy as well as different ways to express themselves creatively."

There are different ways for implementing gamification, for example, by means of badges, progress bars, position tables, scores, etc. With this type of mechanisms students can see tangible growth in their efforts and can feel motivated for doing activities outside and inside the class. This could be a way for ensuring that students will perform activities outside of class. On the other hand, inside the classroom the elements of gamification could help detonate a fair competition or collaboration among students and so progress in a fun and motivating way.

# A critical point of view

Flipped Learning must not be considered as a remedy for all educational issues, even though it has the potential for creating a favorable environment for active learning, committed and centered on the student (Hamdan, et al, 2013, p. 16). Having said this, there are realities and challenges the model needs to overcome.

## Heritage of a traditional education



An example of unfavorable opinion and reaction from students when experiencing Flipped Learning the case of Dr. Persky<sup>4</sup>: Dr. Persky is a great supporter of the model and in one of his recent talks: The Flipped Classroom in Health Professions Education: Expanded Interactive Learning at UNMC he shared some of his findings from its implementations, especially those related to the change resistance lived by students. This model does not allow students to feel comfortable, because, doing things differently will always be uncomfortable. He pointed out although students learn more, they do not like the course and in his particular case, the more he used Flipped Learning in his class, the more his assessment as a teacher went down (Simpson, 2014).

Extract of a conversation with one of his students:

- Student: "I don't know if I'm learning things because of all this active learning"
- Dr. Persky: "But, you got a 99 in the last exam!"
- Student: "I don't feel that you taught me. I learned it all on my own"
- Dr. Persky: "Yes, you did! (triumphantly)"

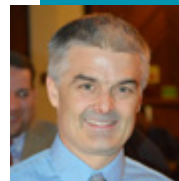
Not all the increase in the workload fell on students nor were they the only ones that suffered "discomforts",

<sup>4</sup> Dr. Persky, associate clinical professor of pharmacotherapy and experimental therapeutics in the Eshelman School of Pharmacy in the University of North Carolina. Was one of the speakers at a recent event The Flipped Classroom in Health Professions Education: Expanded Interactive Learning at UNMC.

all involved felt uncomfortable with the change (including the teacher). Despite the disconcerting findings professor Persky ended his participation in the conference stating: "There is evidence that this works".

The discontent and unfavorable reaction from students can be due to an inherent heritage from the traditional model of teaching where the teacher is responsible for "teaching" and "transmitting" knowledge. The expectation of the "traditional" student is to deposit on the teacher the responsibility for acquire new learning and knowledge.

This situation has two facets: on the one hand, the maladjustment of students to a new class design and, on the other, the handling of their negative reaction. A balance must be achieved between both parties for achieving truly enriching learning experiences. Flipped Learning on its own does not automatically provide this type of exceptional learning experiences; what it offers is the space and time so that teachers can design and perform crucial and challenging learning activities that offer experiences required to state that a given subject has been learned. This model will not work if there is no real value during class time, in this case, students would be right in resenting that they are learning on their own (Talbert, 2014a).



If the teacher could be replaced by a You Tube video, he should be replaced. If a teacher only broadcasts contents then he is not adding any value because content is free and available for anyone to obtain.

## Jonathan Bergmann

Chemistry Teacher, educational trainer, writer and speaker. Pioneer in the flipped classroom and teaching movement.

Students' resistance to a new learning paradigm does not mean that it is bad in itself, it only means that students do not feel comfortable and are trying to find out what the new rules are. It also does not have to be permanent, students can change their opinion, the key lies in effective communication and accompaniment during the transition (Talbert, 2014b). Students enter into conflict because they wish to continue with the previous work scheme: faculty teaching the class and clear instructions on how obtain a good score.



## **New model?... It should already be happening!**

One of the main criticisms of Flipped Learning is that it is not a pedagogical model as such, since has only been the result of the practices by teachers in using different tools for satisfying the needs of their students (Hamdan, McKnight, McKnight, & Arfstrom, p. 15). This observation goes hand-in-hand with other important questionings of the trend; Josh Stumpenhorst (2012), for example points out that active learning and what happens in a student-centered learning environment is something that must or should be happening in classrooms; If “instructional” videos are now directing educational instruction, we are speaking of simply repackaging the traditional model and not a new paradigm or pedagogy of learning.

For a long time, good teachers have tried to make classrooms a place for discussion and learning by doing, not only lectures. This can be seen in those classes where teachers use elements of the Socratic method, the Montessori method, among others. “Flipping the Classroom” suggests that lecturing is the standard for classes and any other thing is a reinvention (Bukola, 2012).

### **“Flipped homework” and content overload**

Gary S. Stager (2013), educator, speaker, journalist and also critical of Flipped Learning, held a debate with Aaron Sams on the University of Southern California’s public radio channel. In this debate, Stager voiced his

main concerns about education in general that are also connected with this trend:

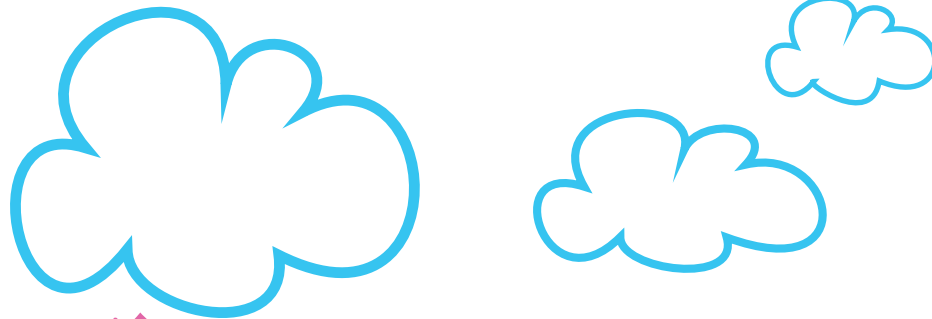
Flipped Learning places great emphasis on courses and homework; neither of them are productive and this model consists only of flipping their positions. Additionally, the assignment of coursework for doing it at home continues to interfere with student’s free time, which should be devoted to personal activities, being with friends and family, practicing sports, working, caring for children, etc., idea that is shared by Nielsen (2012) and Stumpenhorst (2013).

On the other hand, the need for flipping a class also can be a sign of an “inflated” or saturated curriculum, this due to the fact that schools try to cover too much content, part of which has to be taught outside the classroom.

Instead of releasing class time for student-centered teaching, the Flipped Learning model requires standardization of the learning experience, favoring the privatization of education and the elimination of most teachers. He predicts that mediocre teachers will be hired to create videos that will not fit the specific needs of each class.

Sams and Bergmann share Stager’s concern about the substitution of teachers with generic videos. Nevertheless, they also always seek to make it clear that Flipped Learning does not diminish the importance of the teacher, but the opposite.





# CHALLENGES

## 1 Additional work and new skills

Although the idea is very simple its application requires careful preparation. Choosing and preparing the contents implies great effort and time from teachers.

## 2 More class time!

It is necessary to rethink and redesign the activities that will be done during the class. What is appropriate to do during that time is something motivating and exciting so that students will want to discuss the concepts learned at home.

## 3 Expectations from education

Generally speaking, parents as well as students expect a traditional education where the teacher is responsible for teaching and transmitting knowledge. Additionally, the use of Open Educational Resources (OER) or free contents could generate distrust about the academic rigor of the model when the value of the practical part is not understood.

## 4 Level of preparedness and commitment of students

This approach can be very demanding for some students with respect to level of dedication and participation that is required in this type of environment. Faculty must guide them and jointly with them establish clear expectations (Kovach, 2014, p. 40).

## 5 Digital Divide

Although access to computers and Internet is growing rapidly, it is still necessary to take this inequity into consideration. Not all students have home access to the technology they need and, the more the class requires it, the bigger the challenge (Talbert, 2014c).

## 6 More research and documentation

More qualitative and quantitative research is required about the benefits Flipped Learning to identify how to maximize the potential of the model (Hamdan, McKnight, McKnight & Arfstrom, p. 17).

# Recommended Actions

Recommendations prepared by the Observatory of Educational Innovation that will allow exploring the potential of Flipped Learning



## Research and document

It is important that before and during the implementation of the model, research about what this model consists of, must be conducted. This will allow the teacher to have full knowledge of the implications and allow for setting better expectations.



## Establish a strategy

For instructor-led activities it is recommended to focus on high order thinking skills according to Bloom's taxonomy: apply, analyze, assess and create; and, for activities outside of the classroom, the lower order ones: remember and understand.



## Start with something small

It is not recommendable that a full course be changed to Flipped Learning at one time, it is better to first select the most appropriate subjects and assess the outcomes for future adjustments.



## Use different tools

Videos are valuable, but they are not the only tool that can be used. There are others that be a better fit for the goals such as online simulators, books, periodic publications and more.



## Create interactive contents

Educational content must be brief but dynamic so as to hold the student's attention. It is recommendable to include assessment and feedback activities after the process.



## Demonstrate consultation of contents

It is necessary to implement a method that allows the teacher to ensure that students have consulted the contents before class; this facilitates offering differentiated instruction.



## Involve the students

It is recommendable to inform students about the implementation of the model and its characteristics. Students will know that they are taken into account and that their opinion is important, this way, they will have less rejection to change and their availability can be greater.



## Team-up with other teachers

Collaborating with other teachers and generating new ideas helps keep enthusiasm alive, promotes exchange of experiences, reduces efforts, and improves the practice.



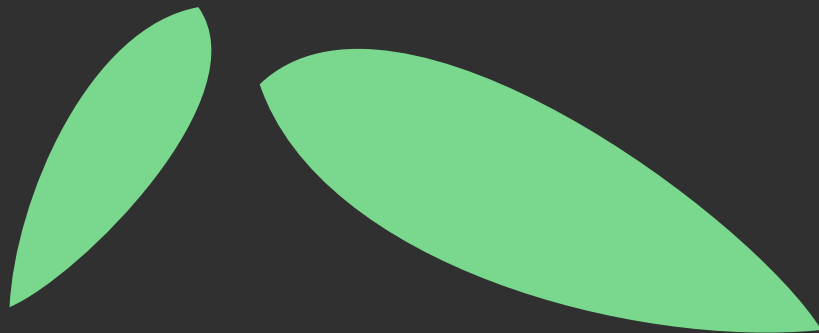
## Do not lose hope

Implementation of Flipped Learning implies a change and therefore students' reaction could be rejection and disagreement. Because of this, it is recommendable to maintain a positive attitude, move forward, request orientation if necessary and adjust the practice.



# Recommendations from **the faculty of the Tecnológico de Monterrey** for implementing Flipped Learning

**Research and document ▲**  
**Inform and consult student's opinions ▲ Request support from immediate supervisors ▲ Important to remember: This is not about making videos ▲**  
**Willingness to devote time for planning ▲ Prior planning of the design of the course ▲ Plan structurally, considering the objectives ▲ Do not change a full course at one time to Flipped ▲ Select the most appropriate subjects ▲ Define the learning objectives and the activities to be performed ▲ Keep the students informed about any changes ▲ Implement the 4 C strategy ▲ Design and organize activities by the name of the subject ▲ Do not lose hope, not everything will work correctly at the beginning and opinions can be negative ▲ Implement a verification method that educational content is being viewed ▲ Assume nothing as related to prior knowledge by the students ▲ Monitor students' performance ▲ Be patient in adaptation to the new model ▲ Be aware of possible rejection by students ▲ Apply feedback surveys to students ▲ Vary the format of the course, not everything has to be “Flipped” ▲ Become involved in Flipped Learning communities ▲ Share experiences with other faculty through different means ▲ Avoid duplicating efforts and make videos jointly with the academy.**



# Credits and Acknowledgments

## Observatory Team

José Escamilla  
Bryan Calleja  
Éder Villalba  
Esteban Venegas  
Karina Fuerte  
Rubí Román  
Zayra Madrigal

### Guest contributors:

Gilberto Huesca  
Kenneth Bauer

## Acknowledgments

Agustín Vázquez  
Angélica Santana  
Antonietta Martínez  
Arturo Alonso  
Darinka Ramírez  
David Peña  
David Schaeling  
Elena García  
Elizabeth Mena Avilés  
Francisco Ayala  
Gabriela Flores  
Gerardo Rocha

Ignacio Cabral  
Jorge Otero  
José Alfredo Hernández  
Karla Gámez  
Katherine Sutton  
Leonardo Glasserman  
Leticia de León  
Luis Fernando Vazquez  
Ma. Eugenia González  
Magaly Caballero  
Mayela Rodríguez  
Misaël Caballero

Mitch Moldofsky (cover image)  
Mónica Delgado  
Noel Hernández  
Norma Lara  
Reyna Martínez  
Rocío Gómez-Tagle  
Rodrigo Ponce  
Rosa Brito  
Sandra Castellanos  
Members of the Innovative  
Community of Tecnológico de  
Monterrey

**Join** the  
**conversation**  
in our social  
networks



<http://bit.ly/ObservatorioFB>



[@observatorioedu](https://twitter.com/observatorioedu)



<http://bit.ly/ObservatorioGPlus>

**Send us your feedback:**  
<http://goo.gl/OS1gkr>



# References

- Arfstrom, K., M. (2014, july). What's the Difference Between a Flipped Classroom and Flipped Learning? EdTech Focus On K-12 Magazine. Retrieved from: <http://www.edtechmagazine.com/k12/article/2014/07/whats-difference-between-flipped-classroom-and-flipped-learning>
- ASCD (2014, september 3). Embracing Flipped Learning Tour with Jonathan Bergmann and Aaron Sams [Webinar]. Retrieved from: <http://www.ascd.org/professional-development/webinars/embracing-flipped-learning-tour-webinar.aspx>
- Bergmann, J. (2012). Flipped Class Spreading Rapidly in Iceland, Leaders Now Aspiring to Flip a Whole Nation. [Podcast]. <http://podbay.fm/show/646787432/e/1382376030?autoplay=1>
- Bergmann, J., y Sams, A. (2012). Flip Your Classroom. International Society for Technology in Education.
- Bergmann, J., y Sams, A. (2013a). Flip Your Students' Learning. Educational Leadership, 70(6), 16-20.
- Bergmann, J., y Sams, A. (2013b). FLIPPING FOR MASTERY. Educational Leadership, 71(4), 24-29.
- Bergmann, J., y Sams, A. (2014). FLIPPED LEARNING: Maximizing Face Time. T+D. Feb2014, Vol. 68 Issue 2, p28-31. 4p. Biblioteca digital ITESM: EBSCO Business Source Premier.
- Bukola, O. (2012, july 11). Flipped classroom - fad or future? Not a Single Story [blog]. Retrieved from: <http://opebukola.com/post/26976380952/flipped-classroom-fad-or-future>
- Crews, T., & Butterfield, J. (2014). Data for flipped classroom design: Using student feedback to identify the best components from online and face-to-face classes. Higher Education Studies, 4(3), 38-47. Retrieved from <http://search.proquest.com/view/1539694590?accountid=11643>
- Devaney, L. (2014). Top predictions for tomorrow's classrooms. Retrieved from <http://www.eschoolnews.com/2014/09/08/future-tomorrows-classrooms-934/2/>
- Donohue, N. (2014). A Working Model for Blended Learning in an Urban School. Retrieved from <http://www.edutopia.org/blog/working-model-for-blended-learning-nicholas-donohue-lourenco-garcia>
- Dumont, A. (2014). Implementing the flipped classrooms and Peer Instruction in a Swiss University of Applied Sciences. Retrieved from [http://www.iced2014.se/proceedings/1134\\_Dumont.pdf](http://www.iced2014.se/proceedings/1134_Dumont.pdf)
- Driscoll III, T., F. (2012). Flipped Learning & Democratic Education. Teacher College, Columbia University [Graduate Thesis]. Retrieved from: <http://www.flipped-history.com/2012/12/flipped-learning-democratic-education.html>
- Galway, L. P., Corbett, K. K., Takaro, T. K., Tairyan, K., & Frank, E. (2014). A novel integration of online and flipped classroom instructional models in public health higher education. BMC Medical Education, 14, 181. doi: <http://dx.doi.org/10.1186/1472-6920-14-181>
- Flipped Classroom Offers New Learning Path. (2011). Electronic Education Report, 18(23), 1-3.
- Flipped Learning Network (FLN) (2014, march 12). Definition of Flipped Learning. Retrieved from: <http://flippedlearning.org/domain/46>
- Fulton, K. P. (2014). Time for Learning: Top 10 Reasons Why Flipping the Classroom Can Change Education. California, US. Corwin a Sage Company.
- Galbraith, J., (2004), Active viewing: and oxymoron in video-based instruction?. Society for Applied Learning Technologies Conference, designer.50g.com/docs/Salt\_2004.pdf
- Gartner (2013, july). Hype Cylce for Education, 2013. En Gartner Inc. Retrieved from: <https://www.gartner.com/doc/2559615>
- Gaughan, J. E. (2014). The Flipped Classroom in World History. History Teacher, 47(2), 221-244
- Gerstein, J. (s.f.). The Flipped Classroom Model: A Full Picture. User Generated Education (blog). Retrieved from: <http://usergeneratededucation.wordpress.com/2011/06/13/the-flipped-classroom-model-a-full-picture/>
- Gojak, L. (2012, October). To Flip or Not to Flip: That is Not the Question! National Council of Teachers of Mathematics. Retrieved from: <http://www.nctm.org/about/content.aspx?id=34585>
- Goodwin, B., & Miller, K. (2013). Evidence on Flipped Classrooms Is Still Coming In. Educational Leadership, 70(6), 78-80.
- Gorman, M. (2012, July 18). Flipping the classroom...a goldmine of research and resources keep you on your feet. Retrieved from: <http://21centuryedtech.wordpress.com/2012/07/18/flipping-the-classroom-a-goldmine-of-research-and-resources-to-keep-you-on-your-feet/>
- Green, G. (2012). My View: Flipped classrooms give every student a chance to succeed. Retrieved from <http://schoolsoftthought.blogs.cnn.com/2012/01/18/my-view-flipped-classrooms-give-every-student-a-chance-to-succeed/>
- Gutiérrez, L., luis.gutierrez@tecmlenio.mx (2014). Discusion Texto para Edu Trends [correo electrónico]. mensaje para Escamilla, J. (jose.escamilla@itesm.mx). Enviado lunes 20 de october.
- Hawks, S. J. (2014). The Flipped Classroom: Now or Never?. AANA Journal, 82(4), 264-269.
- Hennick, C. Flipped 2.0. Retrieved from <http://www.scholastic.com/browse/article.jsp?id=3758360>
- Hamdan, N., McKnight, P., McKnight K. y Arfstrom, K. M. (2013). A Review of Flipped Learning. Flipped Learning Network. Retrieved from: [http://www.flippedlearning.org/cms/lib07/VA01923112/Centricity/Domain/41/LitReview\\_FlippedLearning.pdf](http://www.flippedlearning.org/cms/lib07/VA01923112/Centricity/Domain/41/LitReview_FlippedLearning.pdf)
- James, L. (2013). ON THE FLIP SIDE Educational innovators debate reversed roles for class work and homework. Retrieved from: <http://compassmag.3ds.com/4/Education/ON-THE-FLIP-SIDE>
- JISC Digital Media (2014). Using Video in Teaching and Learning. Retrieved from: <http://www.jiscdigitalmedia.ac.uk/guide/using-video-in-teaching-and-learning>
- Kaufman, S. (2014). Is Flipped Learning the Future of Education?. Retrieved from Blog: <http://www.ptc.com/>
- Kerns, D. (2013). Six key benefits of adaptive learning. En DreamBox Learning, Inc. Retrieved from: <http://www.dreambox.com/blog/six-benefits-of-adaptive-learning>
- King, A. (1993). From sage on the stage to guide on the side. College Teaching, 41(1), 30-35. Retrieved from: <http://www.jstor.org/stable/27558571>
- Kirch, C. (s.f.). WSQing. Flipping with Kirch [blog]. Retrieved from: <http://flippingwithkirch.blogspot.mx/p/wsqing.html>
- Kovach, J. V. (2014). Leadership in the "Classroom". Journal For Quality & Participation, 37(1), 39-40.
- LaFEE, S. (2013). Flipped Learning. Education Digest, Nov2013, Vol. 79 Issue 3, p13-18. 6p.
- Long, K. (2012). Washington college instructors are 'flipping' the way they teach. Retrieved from: [http://seattletimes.com/html/localnews/2019920197\\_flipping17m.html](http://seattletimes.com/html/localnews/2019920197_flipping17m.html)
- Wiginton, B. L. (2013). Flipped instruction: An investigation into the effect of learning environment on student self-efficacy, learning style, and academic achievement in an algebra I classroom. (Order No. 3612166, The University of Alabama). ProQuest Dissertations and Theses, , 261. Retrieved from <http://search.proquest.com/view/1505373684?accountid=11643>. (1505373684).
- Lawrence, W. (2014). From the Diary of a Flipped Classroom Newbie. Retrieved from: <https://www.edsurge.com/n/2014-05-21-from-the-diary-of-a-flipped-classroom-newbie>
- Leonhardt, A. (2014). To flip or not to flip? Connections, 28(3), 18-19. Retrieved from <http://search.proquest.com/view/1540735145?accountid=11643>
- CockrumVideos (2013, july 15). Flipped Learning #53: Peer Instruction with Eric Mazur [video]. En Youtube - Google Hangouts on Air. Retrieved from: <https://www.youtube.com/watch?v=PwHfM0JL2gY>
- Morgan, H. (2014). Flip your classroom to increase academic achievement. Childhood Education, 90(3), 239-241. Retrieved from <http://search.proquest.com/view/1528861665?accountid=11643>
- NMC, (2014). NMC 2014 Higher Education Edition. Retrieved from: <http://www.nmc.org/pdf/2014-nmc-horizon-report-he-EN.pdf>
- NMC, (2013). NMC Horizon Project Short List 2013 Higher Education Edition. Retrieved from: <http://www.nmc.org/pdf/2013-horizon-higher-ed-shortlist.pdf>
- Nielsen, L. (2012). Five reasons I'm not flipping over the flipped classroom. (Technology & Learning, Vol. 32, No.10). Retrieved from: <http://www.questia.com/magazine/1G1-306757880/five-reasons-i-m-not-flipping-over-the-flipped-classroom#>
- NIFDI (2014). Basic Philosophy of Direct Instruction (DI). National Institute for Direct Instruction. Recuperdo de: <http://www.nifdi.org/what-is-di/basic-philosophy>
- Pang Nai Kiat; Yap Tat Kwong (2014 april). "The flipped classroom experience." Software Engineering Education and Training (CSEE&T), 2014 IEEE 27th Conference on , vol., no., pp.39,43, 23-25
- Pearson Partners on Flipped Learning. (2013). Electronic Education Report. 7/8/2013, Vol. 20 Issue 14, p5-5. 1/2p. Biblioteca digital ITESM: EBSCO Business Source Premier.
- Petty, K. (2013). Gamification in the Classroom - Getting Started. CUE Educate-Innovate-Explore Retrieved from: <http://blog.cue.org/gamification-in-the-classroom/>
- Phillips, C. R., & Trainor, J. E. (2014). MILLENNIAL STUDENTS AND THE FLIPPED CLASSROOM. Paper presented at the , 21(1) 519-530. Retrieved from <http://search.proquest.com/view/1519057974?accountid=11643>
- Pierce, R., EdD., & Fox, J., PharmD. (2012). Vodcasts and active-learning exercises in a "flipped classroom" model of a renal pharmacotherapy module. American Journal of Pharmaceutical Education, 76(10), 1-196. Retrieved from <http://search.proquest.com/cview/1327186179?accountid=11643>



- Raths, D. (2014). Assessing the Flipped Classroom's Impact on Learning. Retrieved from: <http://campustechnology.com/Articles/2014/01/22/Assessing-the-Flipped-Classrooms-Impact-on-Learning.aspx?Page=1>
- Raths, D. (2014). Nine video tips for a better flipped classroom. The Education Digest, 79(6), 15-21. Retrieved from <http://search.proquest.com/view/1496698774?accountid=11643>
- Reinhardt, J. Y. (2014). Improving classroom practice through collaborative inquiry: A case of flipped learning. (Order No. 3624225, The University of North Carolina at Greensboro). ProQuest Dissertations and Theses, 149. Retrieved from <http://search.proquest.com/view/1553001840?accountid=11643>. (1553001840).
- Roehl, A., Reddy, S. L., & Shannon, G. J. (2013). The flipped classroom: An opportunity to engage millennial students through active learning. Journal of Family and Consumer Sciences, 105(2), 44-49. Retrieved from <http://search.proquest.com/view/1426052585?accountid=11643>
- Schell, J. (2014, may 1). What is Peer Instruction... in 2 mins. Turn to Your Neighbor [blog]. Retrieved from: <http://blog.peerinstruction.net/2014/05/01/what-is-peer-instruction-in-2-mins/>
- Simpson, K. (2014, april 9). Flipped classroom - a model for the future? UNMC NEWSROOM. Retrieved from: <http://www.unmc.edu/news.cfm?match=12626>
- Southern California Public Radio (Producer). (2013, February 20). Can flipping the classroom fix the educational system? [Audio Podcast]. Retrieved from: <http://www.scp.org/programs/airtalk/2013/02/20/30599/can-flipping-the-classroom-fix-the-educational-sys/>
- Shumski, D. (2014). 6 colleges that flipped STEM classrooms. Retrieved from <http://www.educationdive.com/news/6-colleges-that-flipped-stem-classrooms/229602/>
- Stumpenhorst, J. (December 3, 2012). Not Flipping for Flipped. Retrieved from: <http://stumpteacher.blogspot.com/2012/12/not-flipping-for-flipped.html>
- Szafir, D. y Mutlu, B. (2013). ARTFul: adaptive review technology for flipped learning. CHI '13 Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, pp. 1001-1010. ACM New York, NY, USA. ISBN: 978-1-4503-1899-0. DOI:10.1145/2470654.2466128
- Talbert, R. (2014a, april 28). Flipped learning skepticism: Is flipped learning just self-teaching? The Chronicle Blog Network. Retrieved from: <http://chronicle.com/blognetwork/castingoutnines/2014/04/28/flipped-learning-skepticism-is-flipped-learning-just-self-teaching/>
- Talbert, R. (2014b, may 5). Flipped learning skepticism: Do students want to have lectures? The Chronicle Blog Network. Retrieved from: <http://chronicle.com/blognetwork/castingoutnines/2014/05/05/flipped-learning-skepticism-do-students-want-to-have-lectures/>
- Talbert, R. (2014c, may 16). Flipped learning skepticism: What about technology? The Chronicle Blog Network. Retrieved from: <http://chronicle.com/blognetwork/castingoutnines/2014/05/16/flipped-learning-skepticism-what-about-technology/>
- Ullman, E. (2013). TOOLS & TIPS FOR THE FLIPPED CLASSROOM. Tech & Learning, 33(10), 38-39,42,44. Retrieved from <http://search.proquest.com/view/1354341556?accountid=11643>
- University of Minnesota Center for Teaching and Learning. (2008). What is Active Learning? Retrieved from: <http://www1.umn.edu/ohr/teachlearn/tutorials/active/what/index.html>
- UT Austin CTL (s.f.). What is the Flipped Classroom? Center for Teaching + Learning. Retrieved from: <http://ctl.utexas.edu/ctl/node/425>
- Valenza, J. (2012). The Flipping Librarian. Teacher Librarian, 40(2), 22-25.
- Vaughan, M. (2014). Flipping the learning: An investigation into the use of the flipped classroom model in an introductory teaching course. Education Research and Perspectives (Online), 41, 25-41. Retrieved from <http://search.proquest.com/view/1545869209?accountid=11643>
- Volkswagen (2009). The fun theory. BlueMotion Technologies. Retrieved from: <http://www.thefuntheory.com/>
- Yilmaz-tuzun, O. (2008). Preservice elementary teachers' beliefs about science teaching. Journal of Science Teacher Education, 19(2), 183-204. doi:<http://dx.doi.org/10.1007/s10972-007-9084-1>
- Wallace, A. (2014). Social learning platforms and the flipped classroom. International Journal of Information and Education Technology, 4(4), 293-296. doi:<http://dx.doi.org/10.7763/IJET.2014.V4.416>
- Windelspecht, M. (2014). Unleashing the Power of Adaptive Learning: The Flipped Classroom. Retrieved from: <http://vimeo.com/85610160>

## Imagery and other resources

- Appzgear (2014). Up arrow CC BY 3.0 [icono]. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/up-arrow\\_26045](http://www.flaticon.com/free-icon/up-arrow_26045)
- Elegant Themes (2014). Circular piechart CC BY 3.0 [icono]. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/circular-piechart\\_8810](http://www.flaticon.com/free-icon/circular-piechart_8810)
- Elegant Themes (2014). Quotations round free icon CC BY 3.0. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/quotations-round\\_8750](http://www.flaticon.com/free-icon/quotations-round_8750)
- Freepik (2014). A best test result CC BY 3.0 [icono]. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/a-best-test-result\\_43567](http://www.flaticon.com/free-icon/a-best-test-result_43567)
- Freepik (2014). Career CC BY 3.0 [icono]. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/career\\_13759](http://www.flaticon.com/free-icon/career_13759)
- Freepik (2014). Cinema clapperboard CC BY 3.0 [icono]. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/cinema-clapperboard\\_3457](http://www.flaticon.com/free-icon/cinema-clapperboard_3457)
- Freepik (2014). Cloud sketch shape free icon CC BY 3.0. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/cloud-sketched-shape\\_59576](http://www.flaticon.com/free-icon/cloud-sketched-shape_59576)
- Freepik (2014). Earth globe with maps CC BY 3.0 [icono]. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/earth-globe-with-maps\\_46093](http://www.flaticon.com/free-icon/earth-globe-with-maps_46093)
- Freepik (2014). Female student standing reading text paper sheet free icon CC BY 3.0. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/female-student-standing-reading-text-paper-sheet\\_42940](http://www.flaticon.com/free-icon/female-student-standing-reading-text-paper-sheet_42940)
- Freepik (2014). Female teacher reading with eyeglasses free icon CC BY 3.0. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/female-teacher-reading-with-eyeglasses\\_43386](http://www.flaticon.com/free-icon/female-teacher-reading-with-eyeglasses_43386)
- Freepik (2014). Flip horizontal free icon CC BY 3.0. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/flip-horizontal\\_1505](http://www.flaticon.com/free-icon/flip-horizontal_1505)
- Freepik (2014). Game control tool CC BY 3.0 [icono]. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/game-control-tool\\_37693](http://www.flaticon.com/free-icon/game-control-tool_37693)
- Freepik (2014). Lecture free icon CC BY 3.0. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/lecture\\_46981](http://www.flaticon.com/free-icon/lecture_46981)
- Freepik (2014). Man studying with a laptop free icon CC BY 3.0. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/man-studying-with-a-laptop\\_46979](http://www.flaticon.com/free-icon/man-studying-with-a-laptop_46979)
- Freepik (2014). Man talking by speaker free icon CC BY 3.0. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/man-talking-by-speaker\\_46770](http://www.flaticon.com/free-icon/man-talking-by-speaker_46770)
- Freepik (2014). Market research CC BY 3.0 [icono]. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/market-research\\_14449](http://www.flaticon.com/free-icon/market-research_14449)
- Freepik (2014). Online studies by tablet free icon CC BY 3.0. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/online-studies-by-tablet\\_46853](http://www.flaticon.com/free-icon/online-studies-by-tablet_46853)
- Freepik (2014). Placeholder on map paper in perspective CC BY 3.0 [icono]. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/placeholder-on-map-paper-in-perspective\\_45944](http://www.flaticon.com/free-icon/placeholder-on-map-paper-in-perspective_45944)
- Freepik (2014). Responsive design for variety of screens formats CC BY 3.0 [icono]. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/responsive-design-for-variety-of-screens-formats\\_35883](http://www.flaticon.com/free-icon/responsive-design-for-variety-of-screens-formats_35883)
- Freepik (2014). Steps to complete CC BY 3.0 [icono]. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/steps-to-complete\\_4357](http://www.flaticon.com/free-icon/steps-to-complete_4357)
- Freepik (2014). Strategy hand drawn sketch CC BY 3.0 [icono]. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/strategy-hand-drawn-sketch\\_35567](http://www.flaticon.com/free-icon/strategy-hand-drawn-sketch_35567)
- Freepik (2014). Students talking CC BY 3.0 [icono]. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/students-talking\\_43261](http://www.flaticon.com/free-icon/students-talking_43261)
- Freepik (2014). Two men side by side in a hug CC BY 3.0 [icono]. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/two-men-side-by-side-in-a-hug-with-raised-arms\\_46732](http://www.flaticon.com/free-icon/two-men-side-by-side-in-a-hug-with-raised-arms_46732)
- Herrera, S. (2014). Personal computer screen CC BY 3.0 [icono]. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/personal-computer-screen\\_23247](http://www.flaticon.com/free-icon/personal-computer-screen_23247)
- Icomoon (2014). Flim play button CC BY 3.0 [icono]. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/film-play-button\\_23748](http://www.flaticon.com/free-icon/film-play-button_23748)
- Icomoon (2014). Play button CC BY 3.0 [icono]. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/play-button\\_24142](http://www.flaticon.com/free-icon/play-button_24142)
- King of Monks (2010). Four. CC BY-NC 2.0. Flickr. Retrieved from: <http://goo.gl/acX2Kc>
- Modolfsky, M. (2013, september 13) Chalkles: Flipped Classroom. edreach. Retrieved from: <http://edreach.us/2013/09/20/chalkles-flipped-classroom/>
- OCHA (2014). Schoolboy carrying a bag. CC BY 3.0 [icono]. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/schoolboy-carrying-a-bag\\_27652](http://www.flaticon.com/free-icon/schoolboy-carrying-a-bag_27652)
- Picol (2014). Combine free icon CC BY 3.0 [icono]. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/combine\\_14586](http://www.flaticon.com/free-icon/combine_14586)
- Simpleicon (2014). SEO performance marketing graphic CC BY 3.0 [icono]. Flaticon. Retrieved from: [http://www.flaticon.com/free-icon/seo-performance-marketing-graphic\\_33381](http://www.flaticon.com/free-icon/seo-performance-marketing-graphic_33381)
- Stanford University School of Medicine's Photostream (2011, november 11). 20111111-11-58-32.jpg. flickr. Retrieved from: <http://goo.gl/bDx2Rc>



# OBSERVATORY

## of Educational Innovation

We analyze the educational trends  
that are shaping the future of learning



### Weekly Review

Educational Innovation

A curated media synthesis with the most relevant articles on education, technology and innovation designed for academics and education leaders.



### Edu Trends

Report

In-depth analysis of those educational trends and experiences with the greatest potential to impact on higher education.



### Edu bits

Report

Condensed analysis of strategic issues for education.



### Conference

Watch

Agenda and reports of the most important events on educational innovation.

and more...

**Subscribe**  
observatoryedu.com



Edu Trends, Year 1, number 3, October 2014, a quarterly publication, edited by the Instituto Tecnológico y de Estudios Superiores de Monterrey, Monterrey Campus, through its Vice-Rector of Research and Technology Transfer, under the direction of TecLabs. Ave. Eugenio Garza Sada No. 2501 Sur, Colonia Tecnológico, Monterrey, Nuevo León, C.P. 64849 (<https://observatory.tec.mx/edu-trends>). Editor: Irma Karina Fuerte Cortés. Contact information: [karinafuerte@tec.mx](mailto:karinafuerte@tec.mx), telephone (81) 83582000, Ext. 1025. Rights reserved to exclusive use for number 04-2019-121912052500-203, issued by the Reservation of Rights Department of the National Copyright Institute. ISSN pending. Responsible for the latest update of this issue: Irma Karina Fuerte Cortés. Last updated: June 2020. The publisher does not necessarily share the articles' content, as they are the sole responsibility of the authors. The total or partial reproduction of the content, illustrations, and texts published in these quarterly issues is prohibited without the publisher's prior written authorization.



Feel free to share, copy or redistribute the contents herein in any media or format. You may adapt, remix, transform, and build upon the material free of charge and without collection fees due to any of the authors, coauthors or representatives as per the Creative Commons license terms Attribution-NonCommercial-ShareAlike 4.0 International. For images and photographs please check the proper license for each resource to be used properly.