

Analysis of the Flipped Classroom Model as a Proposal for Teaching Innovation

Miguel Sánchez Moreno
University of Seville

Alejandro Martín Martínez
University of Seville

Flipped Learning is a pedagogical method that gives an active role to the student in order to promote learning. This method proposes an educational innovation by exchanging the use of spaces in such a way that instruction is done at home and homework is done in the classroom. The benefits of Flipped Learning have been the subject of study in numerous studies which conclude that there are interesting benefits at different levels (i.e. educational, social, health, digital), highlighting the use of information and communication technologies, very present in our society with a view to future employment and / or academic. In accordance with the current world situation, characterized by the impact of the pandemic, this pedagogical method seems to be interesting when it comes to developing classes in this context and guaranteeing deep and meaningful learning for the students.

Keywords: flipped classroom, teaching-learning, teaching innovation, education, physical education

INTRODUCTION

From our position as teachers and, in particular, from the subject of Physical Education, we hold the key to try to increase the daily physical activity of adolescent students who pass through our classes from 11-12 to 16 or 18 years of age. According to a report issued by the World Health Organization (WHO) in 2010, 81% of adolescents aged 11 to 17 were not sufficiently active (WHO, 2018). The main issue lies in the fact that, despite following physical activity recommendations, they keep large amounts of sedentary behavior outside of physical activity time, increasing the risk of disease in relation to those who are constantly physically active (Biswas et al., 2015). Following the same sense, the use of cell phones seems to be one of the main causes of sedentary behavior in this type of population, since the greatest amount of time of use of this is performed while sitting (J. E. Barkley & Lepp, 2016)

On the other hand, determining the most appropriate methodologies to enhance student learning, as well as their evaluation, is an intense focus of debate among specialists. An important element for the selection of these methodologies is the context in which the different subjects are developed. Physical Education classes have particular characteristics since, except on specific occasions or due to inclement weather, they take place in a state of higher freedom for students compared to the rest of the subjects in which they remain for hours sitting in a chair. To this we must add the heterogeneity of the groups, the teacher-discussant ratio, and the scarce real time of physical activity, due to the loss of time between lessons,

organization of the material, transfers to the pavilion or sports courts, etc. (Martín & Calvillo, 2017). It should also be taken into consideration that, despite the multidisciplinary training, there are contents in the curriculum that may cause rejection when teaching it due to lack of mastery by the teacher. Given these characteristics of Physical Education, the use of innovative methodologies as opposed to traditional ones to provide solutions to all these problematic situations seems to be a unique opportunity.

Leading to a Constructivist Model

We define a model as the theory that represents the educational practice or how to organize it, i.e., mental representations that illustrate the teacher in the path and directions that his or her teaching takes (Martín & Calvillo, 2017). According to Martín and Calvillo (2017), the most relevant models throughout history have been four:

- *Traditional model*: Teacher-centered. The purpose is knowledge learning based primarily on the educational program and on the transmission of teacher-discussant knowledge.
- *Behavioral model*: Focused on interventional programs. Its goal is instruction for behavioral change. It is very focused on the type of educational program that is established as a means for learning.
- *Constructivist model*: Learner-centered. The learner constructs knowledge. It takes into consideration previous knowledge, the meaning he/she gives to learning and the meaning it has for him/her, in order to favor his/her learning.
- *Performance model*: Focused on competency development. This model is directed towards results comparable to learning standards. However, it includes principles of the learner-centered model, such as the fact that the learner is part of his or her own learning process and the need to incorporate meaningful and collaborative learning.

Once the model is established, we must define the methods and techniques. The method is a means to achieve a purpose, the defined objectives, used by didactics to guide the E-A process (Teaching-Learning Process, Proceso de Enseñanza-Aprendizaje) (Martín & Calvillo, 2017). There is no single or universal method, everything will depend on the purpose we wish to achieve. That is why in the face of new objectives of the E-A process, we must use new methods or methods that lead us to a more student-centered E-A process. Finally, techniques are those activities and actions that the teacher plans and structures for knowledge and learning to take place (Martín & Calvillo, 2017).

Problems of Traditional Teaching

This teaching model is characterized by giving the teacher the role of transmitter of knowledge that the student has to assimilate, playing a passive role in the E-A process (Cardenal, 2009). One of the main criticisms of these models is the difficulty of students to integrate and interpret new knowledge, they do not think critically, retain little information and fail to solve practical problems (Cardenal, 2009). The fact that students receive the content set by the teacher that day does not guarantee that they have learned it. This is one of the main reasons why new methods should be introduced to improve the E-A process and give an active role to the students.

Traditional teaching does not allow us to personalize student learning, attend to their specific needs and adapt to their learning pace. We must leave traditional teaching aside and bet on learning based on authentic experiences (Vélez, Fraile, & Lacambra, 2018). In this sense, we will guide students to understand, synthesize and analyze information critically in order to apply it in different contexts, preventing them from memorizing information and applying it without adjusting it to the context and, in most cases, in the wrong manner (Gámez & Martín, 2016).

With the use of new constructivist models (Díez, Santiago, & Tourón, 2014) students will pay more attention to listening the information, they will be more active in the discussions organized by the teacher, their motivation in their learning will increase and they will be able to share their knowledge with their peers in an interactive and cooperative way (E. F. Barkley & Major, 2020).

Concept and Contextualization of the Flipped Classroom

The ‘Flipped Classroom’ is a pedagogical method that consists of inverting traditional teaching methods. That is, the actual instruction takes place outside the classroom and homework is done in class. This is why the term is also known as swapped classroom or classroom inversion (Bartoll & Puig, 2016). This pedagogical method is based on four pillars:

- *Flexible environment*: Students work at their own pace. This favors meaningful learning and allows for individualized attention to diversity in the classroom.
- *Culture of learning*: Students become responsible for their learning process, acquiring an active role in the learning process.
- *Intended content*: Herein lies the cause of the success or failure of the FC, in the selection and design of programming and materials. We must try to prevent as much as possible situations or problems that may arise.
- *Educators as mentors*: Being able to give immediate feedback to students, advise them on their work, spend more time with them and thus get to know them better will further personalize the E-A process.

Although the term as such was coined by Aarom Sams and Jonathan Bergmann in 2007, this methodology was already being used back in the 1990s in a similar way (Martín & Calvillo, 2017). In Martín and Calvillo (2017) we can read how Lage, Plate and Treglia designed and implemented a similar model that they called ‘*The Inverted Classroom*’ which consisted of viewing lectures before class and dedicating the time of the sessions with their students to resolve doubts and work in small groups. It is these three who are called the precursors of the ‘Flipped Classroom’ and who defined the method as “*events that traditionally take place inside the classroom, now take place outside the classroom and vice versa*” (García, Lemus, & Morales, 2015). In Table 1 we can observe the characteristics of the Flipped Classroom.

TABLE 1
FEATURES OF THE FLIPPED CLASSROOM

Flipped Classroom is	<p>A means to increase interaction and personalized contact time between teachers-students.</p> <p>An environment where students take responsibility for their own learning.</p> <p>A classroom where the teacher is not "the wise man" but "the guide".</p> <p>A mix of direct instruction with constructivist learning.</p> <p>A classroom where students who miss classes are not left behind.</p> <p>A class where the content remains to be reviewed and doubts corrected.</p> <p>A class in which all students are engaged in their learning.</p> <p>A place where all students can get a personalized education.</p>
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Modified from Bergmann, Overmyer, & Wilie, 2013

Flipped Classroom or Flipped Learning?

Generally we call the inverted class as a ‘Flipped Classroom’, but the original term has evolved with the new trends towards the term ‘Flipped Learning’ (FL), which goes beyond the students watching videos, doing certain quizzes or certain readings. If we do not use the time in class appropriately and with the intentionality that is proposed in the methodological model, the learning process may not be affected. The term ‘*Flipped Classroom*’ can be limited to the inversion of the classroom structure, spaces or times, while the term ‘*Flipped Learning*’ includes the purpose of acquiring deep and meaningful learning (Martín & Calvillo, 2017). Both concepts refer to all the principles discussed above and could be used in the same manner, but when we refer to the Flipped Classroom when applying this pedagogical model, it can be misinterpreted by the inversion of the classroom without further discussion. However, as our goal is that the student community acquires a deep and meaningful learning, from now on we will call the model Flipped Learning to avoid being understood as a mere viewing of videos outside class time.

Flipped Learning Model Methodology

The FL methodology is divided into phases or processes through which the teacher must pass in order to be able to apply it. These include planning the contents and designing the didactic material (1st phase), organizing class time and the use of other active methodologies that complement the model (2nd phase), and finally, evaluating with the new model and methodology applied to the contents (3rd phase)

Video as an Educational Resource for a More Individualized Learning Process. As mentioned above, when we refer to the FL model, it can be misleadingly associated only with the viewing of videos by students, replacing the teaching task (Bergmann et al., 2013). It is true that this is one of the most used and attractive resources for students, since this resource combines image and audio, which makes it a very powerful and accessible tool for any student, regardless of the difficulties they may have due to an impairment or disability of any sensory organ. In addition, video as an educational resource allows students to adapt their learning speed (Blasco, Lorenzo, & Sarsa, 2016) and their temporal distribution for viewing the video, granting them greater autonomy and, consequently, greater responsibility.

On the other hand, with the use of video we avoid distractions that students may have during a large portion of the class, as it would be in a master class by the teacher (Santiago & Bergmann, 2018), and we focus their attention, in a short period of time, on the content we want to convey. Bergmann and Sams (2012) recommend that the use of videos should be between 10-15' so as not to lose the students' attention and that we should make a video for each content/topic we want to discuss. This means that the content must be clear and concise, being able to add explanatory notes focusing on the most important contents. The video allows them, apart from maintaining that concentration, to note doubts, allowing a better understanding of the contents and being much better prepared to achieve the objectives of the program, solving the problems posed by themselves and formulating questions and doubts more precisely (Blasco et al., 2016).

Changing Teacher-Student Roles and Increasing Motor Engagement. After planning and designing the educational material to be carried out with the FL model, comes the design and how it affects the development of the class. First of all, it should be noted that in order to implement this pedagogical model it is necessary to use other active methodologies that involve the students in the E-A process. In this section we will not stop to comment on all the methodologies that could be used, but rather on how the use of this constructivist model affects the teacher-discussant role and the time of motor commitment in the field of Physical Education.

On one hand, it has been observed that classroom investment and the teacher's guiding role has improved the teacher-discussant relationship, as teachers better understand their students and thus respond to their emotional and learning needs (Bergmann & Sams, 2012). In addition, this investment provides the teacher with more opportunities for immediate feedback and attention to the students (Bartoll & Puig, 2016). Depending on the methods we use complementary to the FL model, this feedback can come from the teacher or the peer, thus contributing to the integral formation of the person (Bartoll & Puig, 2016). The investment of the class means that homework or tasks are more meaningful, since they can apply and practice their learning under the eyes of the teacher resolving doubts that may arise, however, this is not possible when they do it outside the school context that do not have the teacher as a guide (Bartoll & Puig, 2016).

On the other hand, one of the main modifications of the FL model is in the development of the session, for which we must address several aspects directly related to the model. First of all, we must involve the parents and explain to them how this new model will be developed and, above all, how their child will be evaluated, showing them the benefits of the model (Bergmann & Sams, 2012). The first session will be dedicated to explaining the methodology to the students, mainly how to watch the videos and educate them in this new model (Bergmann & Sams, 2012). As for the development of the sessions, these will undergo changes regarding the traditional one (Table 2). The organization of the traditional class usually deals with doubts or resolves the proposed tasks from the previous day that should have been done at home, advances in the programmed content and, depending on the teacher, leaves time for them to practice and apply the content in class. On the other hand, with the FL model, any doubts that may have arisen about the content or as a result of the content visualized at home are resolved and tasks or debates are proposed so that they

can apply and practice the content, with the help of the teacher to resolve any doubts that may arise during the tasks, practices or debates.

TABLE 2
TRADITIONAL VS. FLIPPED LEARNING MODELS

Traditional teaching		Flipped learning	
Task	Time	Task	Time
Resolution of doubts	5-10'	Resolution of doubts	5-10'
Progress in content	35-40'	Application of new content	45-50'
Application of new content	10-15'		
Time expressed in minutes			

Modified from Bergmann & Sams, 2012

Evaluation as a Result of Process and Not as a Result of Product. For Bergmann and Sams (2012), this also represented a problem when applying the model, since it is not possible to quantitatively assess student learning at all times. For this reason, they defined it as ‘the voice of a GPS’ that redirects the trajectory of the students in the most individualized way possible until they reach the achievement of the objectives set by the teacher. This formative assessment is very useful for the FL model since it is essential to know how students are progressing and whether they are assimilating and understanding the concepts. However, evidence is needed to assess the students’ understanding of these contents, which is why they began to use summative assessment or evaluation. This evaluation can be carried out through videos, through applications or platforms that we will discuss later, and through complementary activities that seek to achieve certain objectives set during the E-A process.

Tools for the Application of the Flipped Learning Model

The use of information and communication technologies (ICT) is one of the most important competencies in current education (Melero & Ardoy, 2020). Although the subject of Physical Education is eminently practical, the use of new technologies could be beneficial to improve the educational process (García et al., 2015). The lack of training on the part of teachers, the lack of equipment in educational centers and the use of the computer as an activity that encourages sedentary lifestyles, hinders the implementation of this new technology in the subject.

There are several studies that use ICT as methodological resources through WebQuest (Poyatos, Valeiras, & López, 2012), the use of cell phones (García et al., 2015) or even blogs (Papastergiou, Gerodimos, & Antoniou, 2011). But difficulties are still encountered in their implementation due to two aspects: motor engagement time and learning time (García et al., 2015). In this sense, the time of physical motor engagement is related to an increase in learning and motor competence (Derri, Emmanouilidou, Vassiliadou, Kioumourtzoglou, & Olave, 2007), therefore, if we use ICT to apply the inverted classroom model and, in this way, increase the time of motor engagement, we will be improving the E-A process of the students.

Benefits of Using the Flipped Learning Model

The FL model frees the teacher and allows a more personalized E-A process for the students. Continuing with the students, we observed several studies that show positive results in terms of motivation, interest, improvement of relationships, etc. One of them shows a high percentage of improvement in terms of interaction with teachers and other classmates, availability of materials, working at their own pace, active and participatory approach and personalization of learning (Santiago et al., 2017). Other authors highlight the personalization of teaching, flexibility in learning, increased interest, access to other teachers who are experts in the subject and/or the use of class time in a more effective and creative way (Fulton, 2012). On

the other hand, there are several studies that highlight increased motivation (Díaz-Garrido et al., 2017), increased academic performance (Díaz-Garrido et al., 2017; Hinojo-Lucena, Mingorance-Estrada, Trujillo-Torres, Aznar-Díaz, & Cáceres Reche, 2018) and satisfaction (García et al., 2015). To avoid that motivation could be affected by external factors such as, for example, the content explained or the lack of adaptation to these methodologies (Gómez-García, Sellés, & Ferriz Valero, 2019), thanks to FL the teacher will be able to include content from a specialist in that subject (Fulton, 2012).

The FL model stands out above all for the increase in motor engagement time in its classes. This increase in motor engagement is closely related to increased learning and motor competence (Derri et al., 2007). Therefore, the implementation of this model and complementary methods provides an improvement in academic performance (García et al., 2015; Hinojo-Lucena et al., 2018).

Another benefit of the FL model is the possibility of teaching subject contents in which they are not specialized, or do not have much knowledge, with the help of videos as an explanatory resource or through links to their blogs (Fulton, 2012). The possibility for students to view or reproduce multimedia content through the Internet makes the E-A process flexible and adequate. They manage their time and with it, the possibility of learning at any time of the day. Finally, due to the importance that our subject of Physical Education currently has in the teaching curriculum, is the time it takes to do the 'homework' of the subject, with those of the FL model being less late and more efficient than those of traditional teaching, according to the students themselves (Santiago et al., 2017).

Problems and Solutions When Applying the Flipped Learning Model

The main problem raised by the use of ICTs integrated in new models such as FLs is accessibility by students. However, according to the National Statistics Institute (INE), in a Survey on Equipment and Use of Information and Communication Technologies in Households (INE, 2019), it highlights that 91.4% of Spanish households have access to the Internet. Furthermore, the use of new technologies by minors is widespread. The use of computers is very high (89.7% of minors have them) and even higher is the use of the Internet (92.9%). In turn, 66.0% of the population between 10 and 15 years of age has a cell phone. The results of the survey show that the use of ICT should not be a problem for teachers when applying this model, since more than 90% of students have access to the Internet at home. One solution to the lack of accessibility would be the use of CDs, pen drives, or any storage device that students can play on a computer, either their own or from the municipal library or the school itself.

On the other hand, the use of ICT could favor sedentary behavior (J. E. Barkley & Lepp, 2016). However, we find that 55% of the student body affirms that, time spent on FL videos either replaces or adds a little time to the total screen time consumption (Santiago et al., 2017). This means that a slight increase in screen time could mean a significant improvement in learning, as long as class time is used appropriately (Santiago et al., 2017).

Another disadvantage of FL would be the non-visualization of the content by the students, which would lead to the non-participation of the practical class (in the classroom) since they have not acquired the contents to be covered. This is an important point to highlight, and for which we can use several strategies. Firstly, there are different applications (for example, EDPuzzle © Spain) that allow us to see who has or has not watched the video. In addition, questions can be implemented to ensure that they not only reproduce it, but also have to pay attention. All this can be part of a formative assessment. Another option proposed by Bergmann and Sams (2012) is to visualize the content while the teacher tries to solve the questions proposed by the students. Because all homework is now done in class, these students have to complete their homework at home as in a traditional model. Because of this, they quickly realize that not watching the videos is going to hurt the use of their time at home.

CONCLUSIONS

The Flipped Learning proposal represents a substantial educational improvement compared to traditional teaching, not only because of what is mentioned in the literature, but also because of greater student motivation, greater autonomy, improved self-esteem and, above all, an active role on the part of the

student. In addition, the implementation of new technologies is considered a key aspect in the academic training of the student community, which must be prepared and competent in digital matters, since technology is taking giant steps to be included in all areas of work and education.

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