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INSTRUCTIONAL DESIGN AND THE FLIPPED CLASSROOM METHOD

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Abstract

The use of technology in education has had a significant impact on the teaching-learning-assessment method. The first results could be observed since the 2000s, with the introduction of computers and the internet in schools. This was followed by the emergence and subsequent access expansion to online learning platforms, culminating in the COVID-19 pandemic, when distance learning became the norm and technology became a necessity for every educational institution. The present study proposes an analysis of the Flipped Classroom (FC) method, an innovative pedagogical framework that aligns the principles of instructional design and the integration of technology in the classroom in order to create student-centered learning experiences. From a structural point of view, it first captures the way in which it has taken shape and evolved over time, and then focuses on its main characteristics, definition, application stages, types, impact in the specialized literature.

Keywords: Flipped Classroom, Technology, Teaching, Learning, Instructional Design.

INTRODUCTION

In recent years, technology has played an important role in the field of education, profoundly transforming the teaching-learning-assessment method. First, it has provided extensive access to extremely varied bibliographic resources, long inaccessible to students and teachers. Bibliographies, dictionaries, specialized books, photographs, maps, etc. can all be accessed at any time and from any corner of the world, being conditioned only by access to the internet. The emergence of online platforms, educational tools and applications has subsequently allowed personalized, interactive learning, has encouraged rapid feedback and collaboration between students in institutions around the world. Recently, technologies such as virtual reality (VR) or augmented reality (AR) allow the creation of immersive learning environments that offer learners captivating, multi-sensory experiences, facilitating the understanding of abstract concepts, reducing learning anxiety (Devon Allcoat, Adrian von Mühlenen, 2018) and, in general, obtaining a better perspective on the covered topics.

Under the impact of these transformations, researchers in the field of education have proposed a series of methods and instructional design models to guide teachers in integrating technology into teaching activities (Heinich, R. Molenda, M., Russell, J., Smaldino, S., 2002; Moersch C., 1994; Hughes, J. E, 2000; Koehler M., Mishra, P., 2009; Kimmons, R., Graham, C. R., 2020 etc.). Among these is the Flipped Classroom (FC) or “flipped class”, an innovative framework with a visible impact in the field of education and vocational training, which involves the reversal of traditional roles in the teaching process. The present study provides an analysis of this method, highlighting its main characteristics, from its definition, brief history and application stages, to capturing the impact recorded in the specialized literature, respectively its virtues and limits.

1. THE FLIPPED CLASSROOM METHOD: DEFINITION, HISTORY, STAGES

The Flipped Classroom, also known as “Inverted Classroom”, “Inverted Teaching”, “Reverse Classroom” or “the Flipped Approach”, is considered a blended learning method that combines traditional face-to-face teaching with online activities (Ağırman, N., & Ercoşkun, M. H., 2022, 72), in order to achieve active, flexible and personalized learning. Several definitions have been advanced in the specialized literature, each of which tries to capture the main characteristics of the model as faithfully as possible. Maureen Lage, Glenn J. Platt and Michael Treglia showed that by flipped classroom we understand “that events that have traditionally taken place inside the classroom now take place outside the classroom and vice versa” (Lage M., Platt, G., Treglia M., 2000, 32). Therefore, if in the case of a traditional lesson, students acquire new knowledge in class, and then apply it at home by solving exercises, in the case of FC the procedure is completely changed. Students acquire information through independent study, carried out at home, and in the classroom they apply and complete it through active involvement in discussions, solving tasks, and problem-solving. Flipped Learning Network (FLN), in turn, considers flipped learning as “a pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive, learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter” (Flipped Learning Network, March 12, 2014). In order to provide a clear framework for implementation, FLN also describes the 4 pillars that underlie the model, presented under the acronym F.L.I.P.:

1. *Flexible Environment* – teachers create a flexible learning environment in which students learn at their own pace and, at the same time, can choose various ways of going through the content (Ibidem).

2. *Learning Culture* – unlike traditional models, where the emphasis is on the teacher, FL promotes learner-centered learning; lessons are focused on collaboration, exploration, and assuming responsibility for learning (Ibidem).

3. *Intentional Content* – teachers choose content with a clear intention: what can be learned individually, at home, what can be explored at school; the emphasis is therefore on developing skills, not just on transmitting information (Ibidem).

4. *Professional Educator* – the role of the teacher is essential in FL: they observe, guide, provide feedback, and adapt the learning process; professional educators are reflective in their practice, establish contacts to improve instruction, accept constructive criticism, and tolerate “controlled chaos” in the classroom (Ibidem).

The methodology of the FC model took shape gradually, starting with the '80s, but was finalized and internationally recognized in the early years of the third millennium. From the data available to date, the first ideas were explored in the Soviet Union, in the '80s, when student-centered learning methods were tested. In 1984, for example, Militsa Nechkina, professor at Moscow State University and member of the Academy of Pedagogical Sciences, recommended that teachers provide students with various texts to study at home, and allocate class time to discussions (Cintas, S.D., 2024). A few years later, in the late '90s, Eric Mazur, professor at Harvard, became one of the pioneers of applying the model in university education (Ağırman, N., & Ercoşkun, M. H., 2022, 72). Mazur provides students with materials to study at home, usually textbooks in physical format, and allocates class time to applying and clarifying concepts. Peer instruction, as he called this approach, has been widely adopted in universities around the world, contributing to redefining the role of the teacher from that of a source of information to that of a facilitator of instruction. In turn, J. Wesley Baker, a professor at Cedarville College, concerned with the integration of technology in teaching, proposes “Classroom Flip”, an approach using the WebCT and Learning Space platforms. “Classroom Flip” aimed to promote the out-of-class approach to the factual and conceptual aspects of lessons, so that the time spent in school would be dedicated exclusively to collaborative and applicative activities (Ağırman, N., & Ercoşkun, M. H., 2022, 75). In the same year, 2000, Maureen J. Lage, Glenn J. Platt and Michael Treglia published the study Inverting the Classroom: A Gateway to Creating an Inclusive Learning Environment, research that analyzes how this innovative model can be applied to teaching economics courses at the University of Miami. Unlike their predecessors, Lage, Platt and Treglia were also concerned with adapting teaching to the learning styles of the students. Otherwise, the procedure remains almost identical: classic lessons are replaced with multimedia materials studied outside the classroom (textbooks, PowerPoint presentations, audio-video files, worksheets based on the content covered, etc.), while the time within the classes is dedicated to interactive activities (Ibidem).

Although the application of the method in the classroom was generally well received, its widespread use did not occur until a decade later when Jonathan Bergmann and Aaron Sams, both chemistry teachers at Woodland Park High School (Woodland Park, Colorado), distributed recordings of lessons taught at school on the Internet to help students who were absent. The method proved to be extremely effective for both

students and teachers: the former could go through the materials at their own pace, while teachers no longer had to spend extra hours in the school to help students catch up on the material (Bergmann, J., Sams, A., 2012, 4). The results thus obtained subsequently led the two teachers to apply the model to the entire class (Ibidem). Data on the history, methodology, resources and impact of the experiment were published by Bergmann and Sams in Flip Your Classroom: Reach Every Student in Every Class Every Day, 2012. The work is considered a reference point in the specialized literature, as it opened the way to a more flexible education, centered on students' real needs. At the same time, it was a source of inspiration for thousands of teachers around the world and led to the creation of professional networks where teachers can share their educational resources and examples of good practices. We recall, in this regard, the Flipped Learning Network (FLN), established in 2012, among whose founders are also the aforementioned authors, Jonathan Bergmann and Aaron Sams.

Based on the results obtained as a result of applying FC in the classroom, Bergmann, J. and Sams A. brought a series of arguments in favor of its use in education: firstly, they argued, the model is a real help for students with learning difficulties. If in a traditional classroom, as a rule, those who are actively involved are the students who are good at learning, while the others passively assist, things are not the same in a flipped classroom. Here, the teacher intervenes exactly when learning difficulties arise, provides immediate feedback, helping the students to overcome the encountered obstacles. Secondly, they continued, FC helps students to excel regardless of their level of cognitive development because, since the lessons are recorded, they can be repeated, without the pressure of having to take notes that they will understand later. Thirdly, FC increases teacher-student and student-student interaction. Class time is dedicated exclusively to group activities, joint projects, debates, which encourages communication and cooperation. Last but not least, FC helps teachers to know their students (Sams A., 2012, pp. 20-32).

Applying the Flipped Classroom method to the classroom generally involves going through the following steps:

1. *Analysis* – the stage involves, first, going through the school curriculum and identifying the topic/topics that can be taught using the FC method; it is also now verified whether students have the necessary technological resources (laptops/tablets, internet access, software resources, etc.), respectively whether they can operate with them in order to access digital content - they know how to navigate various educational platforms, can access video materials, can use collaboration applications or various digital tools, etc.

2. *Designing the teaching activity* – once the appropriate content for this new approach has been identified, the teacher designs the teaching activity – establishes the objectives, depending on the skills to be formed, the teaching-learning-evaluation strategy, the necessary resources (texts, videos, worksheets, interactive presentations, tests, etc.) and the platform/channel for their distribution, the lesson structure, etc.

3. *Preparing the materials* – the teacher chooses from existing resources or creates his/her own materials necessary to cover the contents. These can be texts, audio/audio-video recordings, interactive presentations, worksheets, websites, etc. The materials are distributed to students before class, through digital platforms or

other accessible channels.

For situations where educational videos are required, Bergmann and Sams offer some suggestions for improving them: 1. Be concise – make materials no longer than 15 minutes; 2. Animate your voice – change the inflection of your voice to make the videos more interesting; 3. Create the videos together with another teacher – materials presented in the form of a conversation are more captivating and, therefore, easier to follow; 4. Add humor – playing jokes helps maintain student interest; 5. Don't make students waste their time – focus on the topic being addressed; 6. Add on-screen annotations; 7. Add explanations – draw attention to key elements of the video; 8. Zoom in and out of various elements of the presentation – helps students focus; 9. Produce content in accordance with copyright (Bergmann, J., Sams, A., 2012, 44-47).

4. *Individual study* – is carried out at home; students review the materials received, take notes, answer reflection questions, complete concept maps, formulate their own questions related to less clear aspects or possible curiosities. If the teacher considers it necessary, these can be posted on a platform, 24-48 hours before the class activity, so as to have the necessary time to analyze and group them according to various criteria.

5. *Class activity* – is allocated exclusively to discussions on the materials reviewed at home; the teacher first checks whether the students have understood the information, provides them with additional explanations, and makes additions aimed at ensuring a better acquisition of knowledge; subsequently, depending on the discipline and the specifics of the topic, debates, problem-solving activities, experiments, group projects, games, etc. are organized that involve the application of newly acquired knowledge, encourage collaboration between students, and support the development of critical thinking. The role of the teacher becomes that of facilitator and active observer; he guides the discussions, provides personalized support, helps overcome blockages, and also monitors the students' progress.

6. *Evaluation and reflection* - at the end of the activity, the students' progress is evaluated; also now, the teacher analyzes the effectiveness of the lesson and decides to adjust the strategy and materials for the future.

2. TYPOLOGY AND IMPACT

Marcel Lebrun, professor in the field of educational sciences and advisor at the Louvain Learning Lab, Université catholique de Louvain, proposes a classification of the flipped classroom, intended to help teachers evolve from the simple reversal of learning activities to the profound transformation of learning (Lebrun, M., Gilson, C., Goffinet, C., 2017). Within this, three levels are distinguished: a. Level I - is the classic flipped classroom model; the content, provided by the teacher, is covered at home, and the assignments are solved in class; access to the content is done using online platforms or other channels available to students; class time is reserved for analyzing information, carrying out case studies, formulating arguments, etc.; b. Level II – students are given a topic and must search for information, independently or guided; in class they will present a material written based on this documentation; the activity therefore involves research work, processing information and presenting it in a coherent form; the transition from Level I to Level II, Lebrun showed, demonstrates the concern to personalize learning, to make students more active and, at the same time, more interactive (Classes Inversées, étendons et « systémisons » le concept..., 2014); c. Level III – combines the two types already mentioned: on the one hand, students must search for the information necessary to cover specific topics on their own, and, on the other hand, they must go through the bibliographic materials provided by the teacher, respecting the following sequence: Time 1 (Level II, distance, concrete experience) – students search for information, analyze it and structure it; Time 2 (Level II, presence, reflective observation) – presenting information, identifying similarities and differences, formulating hypotheses, etc.; Time 3 (Level I, distance, abstract conceptualization) – familiarizing with theories, identifying elements relevant to the topic under investigation, writing a summary, etc.; Time 4 (Level I, presence, active experimentation) – consolidating acquired knowledge, applying the model or theory to the topics under investigation (Classes Inversées, étendons et « systémisons » le concept..., 2014).

Since its inception, the Flipped Classroom method has had a significant impact on the educational process, influencing both the teaching act and the way students learn. In recent years, a series of research studies have been conducted, within different disciplines and in various educational contexts, the results of which give us a better perspective on its virtues and limitations. Jeremy F. Strayer, professor in the Department of Mathematical Sciences at Middle Tennessee State University, investigated how learning in an inverted classroom can influence the task orientation, cooperation and degree of innovation of the learners (Strayer, J. F., 2012). His study, How Learning in an Inverted Classroom Influences Cooperation, Innovation and Task Orientation, published in Learning Environments Research (2012), had a considerable impact on the specialized literature. In this study, Strayer compared a traditional statistics class with a flipped one and

observed that students in the flipped classroom were more open to collaborative learning and innovative teaching methods. However, students were less satisfied with the class structure, feeling that they were not sufficiently task-oriented (Strayer, J. F., 2012). Vasiliki Aidinopoulou and Demetrios G. Sampson, in turn, in their study An Action Research Study from Implementing the Flipped Classroom Model in Primary School History Teaching and Learning (2017), noted the formative valences of the flipped classroom in teaching history in primary education, showing that it contributed to a more efficient use of class time and, at the same time, to the active involvement of students in captivating activities, aspects that could also favor the development of historical thinking skills (understanding the concept of time and historical sources, historical analysis and interpretation). However, students' performance in memorizing historical content was similar to that of students in the control group (Aidinopoulou, V., Sampson, D. G., 2017, 245). More recently, in 2021, Qing Zhang, Elizabeth S.T. Cheung and Christian S.T. Cheung, in a rigorous meta-analysis of 20 domestic and international experimental studies on the flipped classroom, highlighted the positive impact of the model on students' academic performance, especially in areas that involved the application of knowledge (the practical SMD being 0.70, compared to the theoretical SMD, 0.63). Flipped classrooms, the three authors showed, are more suitable for sciences (SMD = 0.75) and liberal arts (SMD = 0.72), where they can increase students' interest in learning and, at the same time, transform passive learning into active learning (Zhang, Q., Cheung, E.S.T., Cheung, C.S.T., 2021, 1070, 1073-1074).

3. CONCLUSIONS

FC is a versatile method that can be successfully applied in a variety of educational fields, from primary, secondary and university education, to vocational training. It has been used by teachers around the world in teaching exact sciences and humanities, foreign languages, psychology and social sciences, but also in medicine or even in arts and design.

Like any method, FC has its limits and virtues. Regarding the former, we recall, first of all, the costs necessary to prepare the materials that the learners are going to go through from home. We refer both to material resources, courses for training teachers who do not master technology, fees for accessing video editing programs or educational platforms, and to time, since the creation of teaching resources involves hours of work (designing the material, recording, editing, adding graphics or notes, etc.) for each video file of 10-20 minutes of final content. Of course, the latter can be partially overcome by collaboration between teachers and the exchange of teaching resources or by using/adapting existing resources (Lage M., Platt, G., Treglia M., 2000, 38). Even under these conditions, educational researchers recommend FC instead of traditional classes, showing that: FC allows the organization of group activities and, therefore, active learning, without sacrificing the coverage of course content, helps students to use in learning those methods that suit them best (Lage M., Platt, G., Treglia M., 2000, 38; Arnold-Garza, S., 2014, p. 8). In addition, it facilitates the application of Benjamin Bloom's taxonomy and helps to develop the skills necessary for the 21st century, critical thinking and problem solving, collaboration and teamwork, creativity and innovation: activities carried out at home contribute to the development of the taxonomy's lower levels, to memorization and information understanding, while those carried out in class focus on the higher levels, the application of knowledge (exercises, case studies), their analysis and evaluation (debates, comparisons, argumentation), respectively the ability to create new things based on the acquired knowledge (creation of digital exhibitions, essays).

REFERENCE LIST

Aidinopoulou, Vasiliki, Sampson, Demetrios G., Journal of Educational Technology & Society, Palmerston North, Vol. 20, No. 1, 2017, pp. 237-247.

Ağırman, N., & Ercoşkun, M. H., *History of the flipped classroom model and uses of the flipped classroom concept*, International Journal of Curriculum and Instructional Studies, 2022, 12(1), 71-88. doi: 10.31704/ijocis.2022.004.

Arnold-Garza, S., The Flipped Classroom Teaching Model and Its Use for Information Literacy Instruction. Communications in Information Literacy, 8 (1), 2014, pp. 7-22. https://doi.org/10.15760/comminfolit.2014.8.1.161.

Bergmann, Jonathan; Sams, Aaron, *Flip YOUR Classroom. Reach Every Student in Every Class Every Day*, International Society for Technology in Education, 2012.

Cintas, Susana Dimas, *The Impact of Flipped Learning on the Language Performance of Beginning Spanish as a Second Language Learners*, Revista Nebrija de Lingüística Aplicada a la Enseñanza de Lenguas (RNAEL), Vol. 18, Núm. 36, 2024, doi: 10.26378/rnlael1836561.

Definition of Flipped Learning, Flipped Learning Network, March 12, 2014. See https://flippedlearning.org/definition-of-flipped-learning/. Address accessed on August 6th, 2025.

Devon Allcoat, Adrian von Mühlenen, Learning in virtual reality: Effects on performance, emotion and engagement, in Research in Learning Technology Vol. 26, 2018, https://doi.org/10.25304/rlt.v26.2140.

Herreid, Clyde & Schiller, Nancy, *Case Studies and the Flipped Classroom*, Journal of College Science Teaching, 2013, 42, pp. 62-66.

Lage, M.J., Platt, G.J., Treglia M., Inverting the Classroom: A Gateway to Creating an Inclusive Learning Environment, in The Journal of Economic Education, December 2000, pp. 30-43, DOI: 10.1080/00220480009596759.

Lebrun, Marcel; Gilson, Coralie; Goffinet, Céline, Vers une typologie des classes inversées. Contribution à une typologie des classes inversées : éléments descriptifs de différents types, configurations pédagogiques et effets, Education & Formation – e-306, Janvier, 2017, pp. 125-146.

Lebrun, Marcel, Classes Inversées, étendons et « systémisons » le concept! Essai de modélisation et de systémisation du concept de Classes inversées, décembre 17th, 2014. See http://lebrunremy.be/WordPress/?p=740. Address accessed on August 23rd, 2025.

Online Activities and Assessment for the Flipped Classroom, Centre for Teaching Excellence, University of Waterloo. See: https://uwaterloo.ca/centre-for-teaching-excellence/catalogs/tip-sheets/online-activities-and-assessment-flipped-classroom. Address accessed on July 25, 2025.

Course Design: Planning a Flipped Class, University of Waterloo. See: https://uwaterloo.ca/centre-for-teaching-excellence/catalogs/tip-sheets/course-design-planning-flipped-class. Address accessed on July 25, 2025.

Strayer, J. F., *How learning in an inverted classroom influences cooperation, innovation and task orientation*, Learning Environments Research, 15(2), July 20th, 2012, 171–193. https://doi.org/10.1007/s10984-012-9108-4.

Zhang, Q., Cheung, E.S.T., & Cheung, C.S.T., The impact of flipped classroom on college students' academic performance: A metaanalysis based on 20 experimental studies. Science Insights Education Frontiers, 8(2), 2021,1059-1080. See: https://files.eric.ed.gov/fulltext/EJ1295129.pdf. Address accessed on July 26th, 2025.