Fordism, Taylorism and education

From flexible pedagogies to active learning strategies [*]

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ABSTRACT

This article explores active methodologies—innovative educational approaches that reverse the traditional classroom model. Instead of using in-person sessions for lectures, these meetings are now focused on interactive activities and personalized support, while instructional content is delivered outside the classroom through various materials. This pedagogical shift involves a move away from conventional teaching, promotes collaborative learning, and redefines assessment methods. The growing academic interest in this subject reflects broader educational trends. The article aims to contextualize active methodologies within historical and pedagogical frameworks, highlighting their roots in flexible pedagogy—an educational philosophy that has gained traction since the 1990s by promoting digital integration, flexible work environments, and the decentralization of learning beyond the institutional school structure.

Keywords: Fordism and Taylorism ; Active methodologies ; Flexible pedagogy ; Flipped classroom.

RESUMO

Este artigo examina metodologias ativas — abordagens educacionais inovadoras que invertem o modelo tradicional de sala de aula. Em vez de usar reuniões presenciais para palestras, eles agora se concentram em atividades interativas e atenção individualizada, enquanto o conteúdo instrucional é entregue fora do ambiente escolar por meio de materiais dedicados. Essa mudança pedagógica implica uma rejeição do ensino convencional, incentiva o trabalho colaborativo e redefine os métodos de avaliação. O crescente interesse acadêmico no tópico reflete tendências educacionais mais amplas. O artigo tem como objetivo contextualizar as metodologias ativas em seus fundamentos históricos e pedagógicos, destacando sua conexão com a pedagogia flexível — filosofia educacional que, desde a década de 1990, promove a integração digital, a flexibilização das relações de trabalho e a descentralização da aprendizagem para além da escola institucionalizada.

Palavras-chave: Fordismo e Taylorismo; Metodologias ativas; Pedagogia flexível; Sala de aula invertida.

1 INTRODUCTION

Dear reader, allow us to open this text with a brief passage from the work "O Ateneu", by Raul Pompeia. In the book, young Sérgio, the story's narrator, tells about his arrival at the Ateneu, a renowned school where he would study as a boarding school. Let's look at your initial impressions:

> Aristarchus, sitting, standing, crossing terrible steps, immobilizing himself at unexpected sudden moments, gesturing like a tribune at meetings, calling out as if to an auditorium of ten thousand people, always majestic, raising admirable standards, like an auctioneer, and opulent invoices, he unfolded, with the memory of a last conference, the narrative of his services to the holy cause of education. Thirty years of attempts and results, shining a light on several generations now influential in the country's destiny! What about future reforms? The abolition of corporal punishment was not enough, which already provided a passable benefit. It was necessary to introduce new methods, absolute suppression of shameful punishment, improved modalities in the reward system, adjustment of work, so that the school would be a paradise; adoption of unknown norms whose effectiveness he sensed, as perceptive as eagles. He would create... a horror, the moral transformation of society! (POMPEIA, 1997, p. 14-15).

In the excerpt, the pedagogical expectations of what a modern educational proposal would be if aligned with the values of its time are stated. However, the grandiloquent description of the institution is gradually replaced in the work by the dynamics and contradictions to the disciplines of the Ateneu, where Sérgio lives for two years.

The novel, published at the end of the 19th century, does not focus exclusively on the educational dramas of its time, as it implies that the Athenaeum represents a microcosm of society as a whole. However, the description of the character Aristarco, the director of that boarding school, draws attention. His exposition reveals a series of expectations that, more than a century later, are noted in the public debate.

The character of novelties, based on the principle of efficiency and real contribution to society are elements that are part of the myriad of alleged solutions and paths of contemporary education. However, the proposition of these statements reveals the existence of something to be overcome, which does not seem to exist. Logically, if it is necessary to announce the modernity of something, it therefore presupposes the existence of something to be supplanted.

The teacher, who, like us, is crossed by this universe of expectations and may be surprised to realize that the demands of the 19th century still resonate today. Yet, even with the historical permanence of what we understand as education, there was no shortage of educators and philosophers who focused on the subject with countless pedagogical contributions.

This article reflects the experience of the "classroom floor", with all its concerns, and which is intertwined with a "look in the rear view mirror", in search of the historicity of what presents itself

as a way out.

From the 1990s onwards, a profusion of didactic approaches emerged, generically called "active methodologies," which return to principles dear to activist pedagogy: centrality of the student in the learning process, activity as an essential unit and apparent horizontalization of relationships between teachers and students. However, the innovative aspect that these approaches incorporate into their discourse stems from the new social dynamics of that period: integration with digital technologies, flexibilization of work relationships and decentralization of learning in relation to school.

Although the emergence of several active models did not form a movement in itself, with some level of organization and cohesion, they reverberated, on the other hand, with "imperatives" that stood before the imagination of society that would enter the 21st century: the need to follow the changes in an increasingly connected and fast-moving planet that is based on constant technological innovations - seen until then with deep optimism in the sense of its transformative potential, and within increasingly flexible, open and inclusive social relations.

The collapse of Soviet socialism, the emergence of neoliberal ideas and the perceived crisis of modern metanarratives - family, school, nation, etc. - put on the table the hypothesis that society was witnessing a new historical period, understood by many authors as "post-modernity". Although the understanding established here does not operate in establishing a deep split with modernity, but rather in understanding its metamorphoses in light of its historicity and relationship with the capitalist economic structure, it is undeniable that there were significant transformations that had an impact on the entire planet.

2 THE EMERGENCE OF FLEXIBLE PEDAGOGY

The end of the decade that began in 1970 brought to light not only one of the most serious crises of capitalism, but also an economic reconfiguration on a global scale that determined new forms of sociability and organization of the State. The years that followed this crisis show how its own ideological discourse was infused and imposed on various nations. On the other hand, the period also echoed the demands of various social movements that sought representation and social rights, as well as the struggles of labor organizations, faced with the clear exhaustion of social welfare policies in Europe and the United States. Nevertheless, the criticism of school, as an anachronistic social equipment, disconnected from new political and social demands, gains space in the pedagogical field, to the point that more radical formulations emerged that questioned the very validity of its existence.

> The way in which the qualifications acquired in formal educational institutions were conditioned by the needs of professional work was contested, moving away from a project that critically integrated the world of work and education. Greater autonomy was demanded for students, the flexibility of the rigid hierarchy of times and spaces for the production of know-how. Community learning strategies were encouraged, including by sharing interests, exchanging experiences and aiming to produce more open, dynamic knowledge, as opposed to disciplinary knowledge, centered on the figure of the teacher and curricular content considered archaic and taxing. (ANTUNES; PINTO, 2017, p. 93-94).

Although these demands shared a more progressive ideology, questioning the constitutive bases of school institutions, what we have seen since that time is the incorporation of these criticisms from the perspective of productive demands arising from Toyotist (manufacturing) flexibility. Thus, a broad feeling of discontent in relation to school and teaching is captured, re-elaborating it according to the new economic needs for the reproduction of capital (ANTUNES; PINTO, 2017). Given this, a relationship was gradually outlined in which "market society more directly determines the transformations of the school" (LAVAL, 2019, p.40) and education as a whole.

If the foreshadowing of this movement went back to the 1970s, it was in the 1990s that this process deepened and took on practical contours from a pedagogical perspective. The educational discussion that took place at that time reflected to a large extent the international scenario: having overcome the polarization characteristic of the Cold War, it was now necessary to define which itineraries – in accordance with the triumphant ethics of capitalism projected by its main economic powers – would follow the world that was heading towards to the new millennium. Neoliberalism, by establishing itself as a supposedly global way of life, seeking to eliminate any barriers to its expansion, "occupies the center of individual and collective life, and the only legitimate social values are productive efficiency, intellectual mobility, mental and affective and personal success" (LAVAL, 2019, p. 48). If historical transformations do not occur in the same way across all spaces, this does not mean that developing countries were oblivious to that moment.

During this same period, Brazil sought to strengthen itself democratically after decades of dictatorship and recover from the economic gap marked by hyperinflation. The path that was outlined pointed towards a neo-liberalizing solution, made possible by the governments of Fernando Collor de Melo, Itamar Franco and Fernando Henrique Cardoso; the challenge of rationalizing the State's costs and, at the same time, offering solutions to the enormous social fragility of a considerable portion of the population was embodied in dependence on external capital and the interference of international organizations in the government's organization. The educational ideology that was projected, despite the different pedagogical currents at the theoretical level, also absorbed these influences, reproducing these same dynamics in the design of State policies. But after all this, what are the didactic demands that arise from this scenario?

The articulation of teaching through skills based on the concept of "learning to learn" sets the tone for what is seen as the great pedagogical model of this century. Education would no longer be interested in teaching specific content in itself, but rather in skills to be built, based on countless skills that would allow the individual to deal with increasingly complex and variable scenarios. Therefore, what matters is the construction of attitudes, guided by specific knowledge, according to the demands of a given context. It is worth noting that, although the notion of skills is polysemic, carrying perspectives from different areas of knowledge, its meaning is assumed here in the productive sphere and in the field of know-how (RICARDO, 2010).

The perspective of "human capital", in which the worker endowed with specific "abilities, skills, theoretical and practical knowledge" (ANTUNES; PINTO, 2017, p. 101) produces economic value from his performance, and therefore engenders a demand for constant qualification, placing the responsibility for their success and that of the company on the individual. The "discipline for flexible work in a society crossed by microelectronics requires the ability to work intellectually" (KUENZER, 2016, p. 16); therefore, education gains importance as it provides tools for what is essential in the world of work.

In this horizon, what is valued is no longer the diploma, long-term training, or specializations, but the ability of individuals to adapt to the inconstancies of employability by mobilizing their knowledge in the face of circumstances. A flexible pedagogy (KUENZER, 2016) thus emerges as a possible path that meets the expectations of international organizations, companies and governments.

Recovering elements not only from "Escolanovismo" or the "New School", but also constructivism and technicalism (SAVIANI, 2013) that seem to reference a progressive and democratic bias, they reflect above all the new structural facets of capital, reworking in their own way and in the principles arising from these pedagogical currents. As expressions of this pedagogical flexibility, some attributes stand out: the important role of the student who builds knowledge through teaching mediation; the review of the role of the teacher, who would act much more in the sense of guidance and tutoring than as the exclusive holder of knowledge; the mediation of digital technologies that expand learning opportunities; interest as a starting point for knowledge production, expressed in the possibility of choosing what one wants to learn; valuing a culture of collaboration, open to dialogue; the need for didactic approaches that streamline learning relationships, from the perspective of previous assumptions (KUENZER, 2016). These characteristics articulate, first of all, a series of attitudes or skills that aim to determine teaching; however, they can be synthesized into a single "meta-competence that would consist of "learning to learn" to face the uncertainty raised by the permanent requirement of human existence and professional life" (LAVAL, 2019, p.51).

This concept gains even greater notoriety following the publication of the work "Education: a treasure to discover", published by UNESCO, and which is the result of the work of the International Commission on Education for the 21st Century between 1993 and 1996; throughout the text, all the principles listed above appear as constitutive elements of its authors' argument, sometimes in relation to the model of society they designed, sometimes about the new educational paradigm that they aimed to build.   Learning in this sense is an active process, the result of interest and mediation - whether from the teacher, family members, the media, etc., in which "mastery of the instruments of knowledge themselves" is expected (DELORS, 2003, p. 90). This principle seems to provide, to some extent, support to answer one of the key questions of pedagogy: how do we learn? Appropriating contributions in the field of psychology, neurology, philosophy and sociology, for example, "learning to learn", according to Delors (2003), alludes to an intellectual curiosity imbued with an investigative spirit referenced in scientific research and its methods; promotes the "exercise of attention, memory and thought (...) with advances and retreats between the concrete and abstract (...) and increasingly linked to the experience of work" (p. 92). The perception that certain attitudes are more important for learning than what is learned underlies a search for rationalization of knowledge itself, which is oriented according to specific demands.

Finally, if the student has the role of active subject around whom all educational practice revolves, what is the role of teachers in this context? Although it seems to play a secondary role in the teaching-learning process, contemporary flexible pedagogy places a significant part of the responsibility for the success of school systems on the teacher. Under his leadership, it is then up to motivating the student to learn, establishing connections between knowledge and the school environment in the light of an interdisciplinary perspective, understanding the importance of digital technologies, appropriating them for the benefit of their use in teaching (LIBÂNEO, 1998; DELORS, 2003). However, they must face socio-emotional problems, resulting from the school environment, guiding

> (...) students on a range of social issues from the development of tolerance to birth control, but also that they succeed in developing areas where parents, religious institutions and public authorities have often failed. They must also find the right balance between tradition and modernity, between the child's own ideas and attitudes and the content of the programs. (DELORS, 2003, p. 154).

Given this, teachers also need to equip themselves with different skills that can cope with the demands placed on them in the classroom. The "new teaching attitudes" (LIBÂNEO, 1998, p. 12) that are demanded by society in its transformations require a continuous training process with a view to formulating skills that can handle the education of the future. Although the space for action of public policies and management bodies is recognized, it is under the responsibility of the teacher

that most of the requirements fall, individualizing the responsibilities that should be debated and shared with society.

3 ACTIVE METHODOLOGIES: DEFINITION AND DIFFERENT TYPES

If the pedagogical ideal that is intended to be built in the third millennium has its bases in the model of flexible accumulation (ANTUNES; PINTO, 2017; KUENZER, 2016) that is articulated with a professional ethic of adaptability and development of skills, it is up to the teacher to look for solutions to the dilemmas he faces in his profession. There are several paths and theoretical productions that point to different interpretations of this phenomenon; however, considering the thematic focus established in this work, it is necessary to analyze the emergence and popularization of approaches and methods that are circumscribed under active methodologies.

Although the idea of didactic choices that favor student activity are not necessarily new in education, given that they date back to the Modern Age, the conditions in which these practices are founded and understood in contemporary times are unique. In addition to an economic model that determines its principles under school organization, it should be noted that this is a scenario in which information and Information and Communication Technologies (ICT), mediated by the internet, are a central part of people's daily lives and reflect a process irreversible possibility of expressing and consuming information and knowledge. Education expanded, guaranteeing access for the population to schools and universities never before experienced; Democratic advances, despite current political upsurges, have opened space for the affirmation of multiple identities, in their dimensions of race, class, gender, etc.; therefore, educational institutions receive a greater number of students, coming from different groups and social classes and are affected by the impacts, to a greater or lesser extent, in the use of ICT. The profile of the student and also the teacher is different in relation to other historical times.

The current meaning of active teaching methodologies emerges as one of the expressions of what is understood as a flexible pedagogy, from the 1980s onwards, articulating studies of psychology and neuroscience (MOTA; ROSA, 2018). The active conception of education in these terms seeks, then, to offer elements that are capable of facilitating student learning through teaching mediation with the use of appropriate strategies.

From a pedagogical point of view, the New School thinking is mainly taken up in its most important foundations: student autonomy, the possibility of individualizing teaching, the teaching mediating role, the importance of doing and experience as a means of learning, the use of games and activities in group, the integration of technological and digital tools, student interest as a starting point and the importance of the social environment for motivation and reference (MORAN, 2015;

BERBEL, 2011; BARBOSA; MOURA, 2013; BACICH; MORAN, 2018; LOVATO, MICHELOTTI, LORETO, 2018; ANASTASIOU, 2014).

Furthermore, the definition of any method that is intended to be active carries within it a strong critical component to "traditional teaching", in all its characteristics: passivity, authoritarianism, valuing content over form, among others. However, the uniqueness of the current understanding of active methodologies, crossed by the context exposed in the previous paragraph, results from the combination of two factors: the contribution of research within the scope of cognitive psychology, especially with regard to metacognition, and the profusion of so-called active proposals developed, in general, from teaching experience in the face of difficulties in their professional activity.

A key element in the formative path of flexible pedagogy, the competence expressed in "learning to learn" has its foundations in the concept of metacognition that "emerges with strategies capable of holding the student responsible for the analysis, regulation and evaluation of the mechanisms that promote their learning" (MOTA ; ROSA, 2018, p. 265). This field of study aims to indicate resources, based on the understanding of psychological and brain mechanisms that can assist the teacher in the learning process with students. To a certain extent, it scientifically validates the invariably active component in human learning, substantially influencing pedagogical production regarding active methodologies in recent decades.

Under this meaning, active strategies are carried out to the extent that they make it possible for the learner to grasp knowledge (ANASTASIOU, 2014), ultimately, which, beyond a simple mnemonic activity, becomes a memory imbued with meaning. Furthermore, metacognition is not only articulated but depends on "the teacher's ability to translate learning contents into learning procedures, i.e., into a sequence of mental operations that he seeks to understand and institute in the classroom" (ANASTASIOU, 2014 , p. 22).

Although it is not feasible to map with an absolute degree of certainty the totality of teaching methodologies considered active, it is possible to point out the main types, namely: Problem-Based Learning (PBL); Project-Based Learning; Team-Based Learning – TBL; Peer-Instruction; Flipped Classroom; Jigsaw; Division of Students into Teams for Success (Student-Teams-Achievement Divisions – STAD); Team Games Tournaments (Teams-Games-Tournament – TGT); Gamification; Design Thinking (MORAN, 2015; BERBEL, 2011; LOVATO, MICHELOTTI, LORETO, 2018; BACICH; MORAN, 2018). Although it is not the objective of this work to explore each one in its history and characteristics, it is worth highlighting two attributes in common among them: the diversity of areas that created and explore these methodologies and their locus of production being notably from the United States.

Firstly, these teaching possibilities are related to a wide range of areas of knowledge – law,

administration, medicine, computer science, etc., and are not specifically limited to educational theorists', which demonstrates the interdisciplinarity of the topic, establishing dialogue between different types of knowledge. In this sense, these methodologies fulfill the function of providing solutions to learning problems and demands, especially in higher education, and are therefore being constructed through a pragmatic bias. Thus, the production that deals with these methods is much more focused on evaluating their effectiveness and applicability in different scenarios than on the epistemological discussion of their foundations; however, the optimistic aspect of building new educational possibilities seems to obliterate the critical dimension of active proposals regarding their limits.

Although the volume of academic publications is considerable – articles, theses, dissertations, books – that address active teaching methodologies in the last decade, considering their applicability in the context of the country, it is curious to realize that this is a discussion that reverberates from the experiences in the United States. It is noteworthy, for example, that none of the methodologies mentioned here are Brazilian, despite its vast academic production. If the need to rethink the teaching structure is undeniable, is it possible to think in terms of our nationality? Paulo Freire, a global reference in education, despite his detractors, points out ways in this direction; if we cannot close our eyes to the already consolidated literature, it is also necessary to carry out an autonomous reflection, which takes into account the country's power dynamics and challenges.

4 PIONEERING INITIATIVES

As one of the possibilities for hybrid learning, the "Flipped" Classroom Model (FCM) has as its operative axis the inversion of the classic dynamics of traditional teaching: if previously the expository class would take place in person and the activities and exercises related to the content in an extra-class environment, FCM makes the classroom is the locus of the activity, while moments of oral exposition are now carried out outside the school (BERGMANN; SAMS, 2016).

The precursor initiatives of the flipped classroom date back to the 1990s with the emergence of two didactic proposals in the United States (TREVELIN; PEREIRA; NETO, 2013; VALENTE, 2014; SCHIMITZ, 2016; RIOS, 2017): the " Peer Instruction" (peer instruction) and the "Tailored Teaching" (just-in-time) method. In both, the dynamics of exclusive oral exposition in class are subverted, placing emphasis on carrying out activities and exercises. In this way, extra-class moments are dedicated to the theoretical study of the subjects to be covered in class, as well as asking diagnostic questions that can guide the teacher's class. To a large extent, these are methods that seek to rationalize the use of time in class, with a clear subdivision of activities to be carried out during face-to-face meetings, with a view to better learning performance, verified through regular

assessment tests. The table below briefly shows the modus operandi of one of these approaches.

Table 1 – Summary of the *Peer Instruction method*

STEPS TO BE FOLLOWED	TIME	PEDAGOGICAL GUIDELINES
Professor presents the concept.	7 to 10 minutes	Emphasize the concepts that underlie the principle. This presentation may include a demonstration.
Proposition of the question by the teacher.	1 minute	Present a conceptual multiple-choice question and assure students that there are no misunderstandings regarding the question.
Time for the student to think and write down the answer individually.	2 minutes	More time would get them to start using equations. Do not allow them to talk to each other at this time.
Moment of debate: the student must try to convince the colleague next to him that his answer is correct.	1 to 2 minutes	Participating in some of these discussions will allow the teacher to evaluate errors and see how the students who got it right explained their reasoning.
Feedback to the teacher: records of responses.	1 minute	Students show the results and the teacher collects the answers.
Explanation of the correct answer by the teacher.	2 minutes or more	Depending on the result, time will be dedicated to explaining the correct answer.

Source: MAZUR, 2015, p. 10-12, *apud* RIOS, 2017 (adaptation).

Although activity is a central factor, both in the Peer Instruction and in Tailored Teaching methods, the example above makes it clear how there is a disciplining of times and spaces based on this logic, under the discourse of student engagement. Both proposals permeate the idea of a technique subordinated to increasing the effectiveness of learning results, in which educational practice is an end in itself; furthermore, it should be noted that these are initiatives arising from the teaching experiences of their creators in higher education institutions, linked to the teaching of exact and technological science content.

The first time that the terms *flipped classroom* and *inverted classroom* appear in the literature is in the works of Baker (2000) and Lage, Platt and Treglia (2000), respectively. Similar to their predecessors, the authors sought better ways to manage time in class, based on their teaching experience in the university environment, preventing their students from focusing exclusively on theoretical explanations and not having enough moments to solve exercises and/or answer questions.

According to Baker (2000), there were two changes considered central in the contemporary educational perspective and which were fundamental to understanding the *flipped classroom*: the change in pedagogical philosophy, based on cognitive psychology and the understanding that the

learning process only takes place when it is active , as it has been followed by the introduction of new digital technologies, with the popularization of computers and the internet, that allows new forms of communication and construction of knowledge.

Considering these two elements, Baker (2000) proposed a redesign of the traditional teaching dynamics based on the inversion of activities carried out at home and in the classroom; thus, at the end of the 1990s he applied the method with his classes at Cedarville University and, realizing viability and good repercussions, published its results. The new technological tools implemented at the university where he taught allowed materials to be made available for prior reading, as well as online discussion forums and quizzes that stimulated students. Therefore, at the heart of face-to-face meetings was active learning, which provided for interaction between students, seeking to establish relationships between previously read content and real problems, practical applications, among other aspects.

In the same year that the fruits of John Wesley Baker's method were published, the article "Flipping the classroom: the gateway to creating an inclusive learning environment" by Lage, Platt and Treglia (2000) was published to systematize the principles of what they called inverted classroom. The authors assume that there are different learning styles, listing the existence of different student profiles; therefore, they conclude that the ideal is for there to be different forms of teaching, to the detriment of the traditional model – which did not cover all students.

Considering the institutional limits of universities, in their own structure with pre-determined workload and curricula, for example, and also the possibilities opened up through web resources and access to tools available on a computer, the authors concluded that the inversion of activities extra-class and in-person classes would allow for better use of time in class in order to actively and collaboratively involve students.

Teachers made online material available to students in Microeconomics classes at Miami University in different formats: presentation of concepts, which could be accessed and copied onto videocassette tapes; *PowerPoint* presentations with explanatory narrations; and the texts of the authors to be studied. The class meetings were aimed at resolving doubts, laboratory experiments, preparing worksheets, with small questions about the topics covered. This strategy, by articulating different instructional resources in the most varied supports with the different activities carried out in class, made it possible for students to learn, despite different learning profiles and, according to the authors, by advocating the active aspect, it achieved better student engagement.

Although they were pioneering approaches to the subject, even in the 1990s, articulating technological tools and active learning, with evidence of the positive impacts of these experiences, there was little impact in academia, which did not allow for their immediate popularization (VALENTE, 2014).

5 THE WORK OF BERGMANN AND SAMS AND THE DISSEMINATION OF THE FLIPPED CLASSROOM

The flipped classroom, in the terms in which it became popular, has as its main reference the work of teachers Jonathan Bergmann and Aaron Sams, who created the approach in 2007, while teaching chemistry at Woodland Park High School (USA), located in a rural area. According to the authors, FCM was an alternative created by them in response to some difficulties faced by several students who were absent from high school. Thus, using screen capture software, they recorded the explanation of the theoretical content worked on, in sync with the *PowerPoint slide* presentation and made it available online for students who had missed classes (BERGMANN; SAMS, 2016).

Within a few months, they realized that not only did the videos become popular among students, but they also served as a reference for other chemistry teachers in the country who started using them in their classes. This experience made Bergmann and Sams realize that the theoretical chemistry class did not necessarily need to be held in class, as they could make widely accessible recordings available and use the time in the classroom to solve exercises with the students, as well as dedicate themselves to laboratory experiments. Thus, between 2007 and 2008, the authors "inverted" the classes they were responsible for together and noticed that the results were promising, achieving greater commitment and interest from students in relation to the curricular component.

In general, this approach foresees that the classroom is no longer an exclusive space for learning – it is a place for debates and problematization of what the student previously knew about the subjects to be covered in class. Thus, students have contact with materials relating to a specific topic before the in-person class; these educational objects can be in the most diverse formats, such as texts, explanatory videos, infographics, games, etc., and are mostly produced by the teacher himself and made available online or on some physical support, both of which are easily accessible. When the meeting takes place in class, instead of the traditional lecture, there is a debate on previously studied materials, resolution of doubts and exercises, in addition to enabling more individualized monitoring, which meets the needs of the student.

FCM consequently promotes a review of the usual teaching dynamics, guiding a new temporal organization in the class and extending learning possibilities beyond the exclusive oral transmission focused on the teacher. Table 2 allows you to better observe this process.

Table 2 - Comparison of time use in traditional and flipped classrooms

Traditional Classroom		Flipped Classroom	
Activity	Time	Activity	Time
Warm-up activity	5 minutes	Warm-up activity	5 minutes
Go over last night's homework	20 minutes	Go over last night's homework	10 minutes
New content lecture	30-45 minutes	Independent guided practice and/or lab activity	75 minutes
Independent guided practice and/or lab activity	20-35 minutes		

Source: BERGMANN; SAMS, 2016, p. 13.

Although the form of organization expressed in table 2 is related to the context of chemistry teaching in which the teachers worked, it is possible to notice the impacts of inverting the classroom: the time allocated to oral exposition disappears and is reserved for an extra-class environment.

According to Bergmann and Sams (2016), adherence to FCM would be justified based on some factors, namely: the productive use of tools available on the internet, which are part of the student's daily life, for the benefit of learning, allowing the student to manage their time according to your needs and interests; the chance of better understanding the theoretical contents as there are potentially fewer distracting elements in relation to the classroom environment, as well as the feasibility of resuming speeches, moving forward or pausing them when deemed necessary; the possibility of better interaction with teachers, as long as they effectively allow the expansion of spaces for dialogue in the class; reduction of problems related to indiscipline, as students feel more motivated in this proposal.

Therefore, according to the arguments presented, there is a rationalization of the activities to be carried out with a view to greater productivity, understood here under the bias of interest and the effectiveness of learning, as well as the possible personalization of teaching as there is greater interaction between teachers and students, allowing difficulties to be identified in a particular way. Like this:
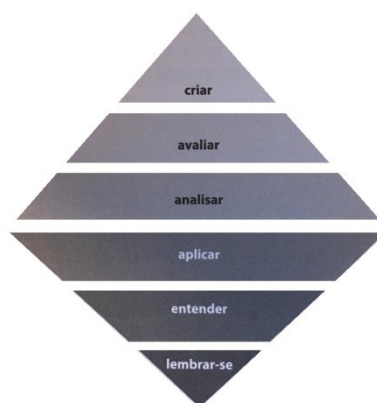
> (...) the purpose of the flipped classroom is not just the inversion of traditional pedagogical processes, whether through digital technologies or not. But rather, in the challenge of providing active and personalized learning that gives students the opportunity to develop their intellectual, social and humanistic capabilities, and become protagonists, that is, responsible for their learning. (RIOS, 2017, p. 63).

Furthermore, ICT plays a central role in this process, as it is from them, in general, that the flipped classroom approach is made possible; however, Rios (2017) warns of possible problems regarding the use of digital media as they should not replace classroom activities. Thus, "the great potential lies in face-to-face interactions" (RIOS, 2017, p.110), as they guarantee student participation and the collaborative construction of knowledge. Furthermore, the use of technologies, when planned and directed, contributes to increased interaction between teachers and students, allowing them to better understand their difficulties, establish stronger bonds with the class, in addition to encouraging autonomy in students, who pass to understand its importance in the collective construction of knowledge (BERGMANN; SAMS, 2016).

The flipped classroom also enables, according to Bergmann and Sams (2016), learning for mastery by allowing "students to achieve a series of objectives at their own pace" (p. 47), from the completion of asynchronous individual and group activities and different assessments, depending on the student's learning. This flexibility even allows us to advance even further with the personalization of teaching, allowing the student to take responsibility for their own learning, within a given period. The curriculum, under this logic, also adapts, as it becomes domains and does not necessarily require everyone to study a specific topic at the same time. Therefore, it is clear that this is not a hermetic approach, as FCM integrates different theoretical contributions and teaching methodologies.

Furthermore, when proposing the inversion of classroom and extra-class routines, FCM, according to Bergmann and Sams (2018), takes Bloom's Taxonomy as its guide, focusing on carrying out "more difficult cognitive tasks" in class (BERGMANN; SAMS, 2018 , p. 09), to the detriment of simpler activities such as reading a certain text or watching a video. If there is a hierarchy of ways in which an individual learns, FCM proposes to invert the pyramid of this theory, allowing teachers to monitor and guide the performance of more complex tasks. The following diagram allows you to visualize, according to the principles of Bloom's Taxonomy, the logic that is applied in the SAI depending on the time allocated for the stage.

Figure 1 – Bloom's Taxonomy in Diamond format

(CREATE, EVALUATE, ANALYZE, APPLY, UNDERSTAND, REMEMBER)

Source: BERGMANN; SAMS, 2018, p. 10.

Thus, taking as a reference this model of knowledge construction based on cognitive capabilities in relation to the most effective attitudes that can guarantee learning, FCM is organized as a didactic proposal, mediated by the teacher, aiming to guarantee spaces for creation, evaluation and analysis usually external to the classroom experience.

The work of Jonathan Bergmann and Aaron Sams and their FCM outreach initiatives, combined with the growing advancement of digital technologies, allowed the approach to become popular around the world. According to Valente (2014), from 2010 onwards there was a worldwide movement of increasing interest in FCM, both in academia - not only as an intellectual production, but also in relation to the adoption of FCM as a didactic guide, in addition to investment by companies and international consortia interested in its dissemination. Since then, several educators around the world, based on its basic precepts, have used and researched this approach.

Although there is no established consensus regarding a single concept, the creation of the Flipped Learning Network (FLN), in 2012, a non-profit institution, aims not only to disseminate the topic, but also to serve as a reference so that other teachers can implement the proposal. In this sense, the FLN published the report Flipped Classroom Field Guide (2014), which establishes some fundamental aspects of classroom flipping:

> 1) classroom activities involve a significant amount of questioning, problem solving and other active learning activities, requiring the student to retrieve, apply and expand material learned online; 2) Students receive feedback immediately after carrying out face-to-face activities; 3) Students are encouraged to participate in online and in-person activities, which are included in the student's formal assessment, that is, they are worth a grade; 4) both the material to be used online and the classroom learning environments are highly structured and well planned. (VALENTE, 2014, p.86)

Although the use of FCM allows adaptations and compositions with other types of

methodologies, these principles bring together the characteristics considered essential to the approach and serve as a guide to identify the approach in its essential aspects.

6 FINAL CONSIDERATIONS

In the work "O Ateneu", mentioned at the beginning of this article, the narrator, when revealing his memories, opens the story with a speech from his father: "you will find the world" (POMPEIA, 1997, p. 3). The world he was referring to was the educational institution in which the story takes place. If at first glance, the world of possibilities seemed to generate expectations, throughout the narrative Sérgio becomes frustrated with what he finds. Abstracting the circumstances and intentions of the author, the feeling is not uncommon, whether in 1888, the year the story was published, or in 2020. That, even with the limitations imposed, and the various weaknesses and contradictions that permeate the school, these are not enough to prevent the search for new paths, and for the dilemmas that confront us to be debated and given new meanings.

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