

# Interfaces entre o Ensino Híbrido e o Ensino de Ciências na Formação Docente

Interfaces Between Hybrid Teaching And Science Teaching In Teacher Education

Interfaces entre la enseñanza híbrida y la enseñanza de las ciencias en la formación del profesorado

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**RESUMO:** No cenário atual educacional, encontra-se o ensino híbrido denominado modelo de formação pelo qual se combinam atividades de ensino presenciais, com outras realizadas a distância e apoiadas em tecnologia da informação e comunicação (TIC). Sua finalidade é contribuir para alcançar os objetivos educacionais desejados a partir das vantagens que oferece cada ambiente. O processo de aprendizagem nessa modalidade, desenvolvido pelas metodologias ativas, remetem a práticas integradoras capazes de transpor os alunos do ambiente tradicional (sala de aula) a um lugar de tomada de decisões, experimentações e práticas significativas. Objetivamos compreender o formato de formação docente para o ensino híbrido e suas relações com o ensino de ciências. Trata-se de uma pesquisa qualitativa, na modalidade exploratória, desenvolvida a partir de produções atuais da área e aplicação de questionário sobre a temática com professores de ciências. Os resultados revelam que práticas de ensino na perspectiva das metodologias ativas propiciam motivação e curiosidade dos alunos sobre conhecimentos científicos, potencializando o engajamento nas tarefas. O objeto de estudo é fundamentado por autores como: Christensen, Horn, Staker, Valente, Moran entre outros. Ademais, o uso dessa prática propicia experiências formativas ao professor, desenvolvendo novas habilidades e construindo outros saberes para melhorar a sua práxis educacional.

**ENSINO HÍBRIDO. ENSINO DE CIÊNCIAS. FORMAÇÃO DOCENTE.**

**ABSTRACT:** In the current educational scenario, there is the hybrid teaching called the training model through which face-to-face teaching activities are combined with others carried out at a distance and supported by information and communication technology (ICT). Its purpose is to contribute to achieving the desired educational goals based on the advantages offered by each environment. The learning process in this modality, developed by active methodologies, refer to integrative practices capable of transposing students from the traditional environment (classroom) to a place of decision-making, experimentation and significant practices. We aim to understand the teacher training format for hybrid teaching and its relationship with science education. It is a qualitative research, in exploratory mode, developed from current productions in the area and application of a questionnaire on the subject with science teachers. The results reveal that teaching practices from the perspective of active methodologies provide students with motivation and curiosity about scientific knowledge, enhancing their engagement in tasks. The object of study is supported by authors such as: Christensen, Horn, Staker, Valente, Moran among others. Furthermore, the use of this practice provides the teacher with formative experiences, developing new skills and building other knowledge to improve their educational praxis.

**HYBRID TEACHING. SCIENCE TEACHING. TEACHER FORMATION.**

**RESUMEN:** *En el escenario educativo actual, existe la enseñanza híbrida denominada modelo formativo por el cual se combinan actividades docentes presenciales con otras realizadas a distancia y apoyadas en las tecnologías de la información y la comunicación (TIC). Su finalidad es contribuir a la consecución de los objetivos educativos deseados a partir de las ventajas que ofrece cada entorno. Los procesos de aprendizaje en esta modalidad, desarrollados por metodologías activas, se refieren a prácticas integralizadoras capaces de trasladar a los estudiantes del ambiente tradicional (aula) a un lugar de toma de decisiones, experimentación y prácticas significativas. Nuestro objetivo es comprender el formato de formación docente para el aprendizaje semipresencial y su relación con la enseñanza de las ciencias. Se trata de una investigación cualitativa, en la modalidad exploratoria, desarrollada a partir de producciones actuales en el área y aplicación de un cuestionario sobre el tema con profesores de ciencias. Los resultados revelan que las prácticas docentes desde la perspectiva de las metodologías activas proporcionan a los estudiantes motivación y curiosidad por el conocimiento científico, potenciando el compromiso con las tareas. El objeto de estudio se sustenta en autores como: Christensen, Horn, Staker, Valente, Moran, entre otros. Además, el uso de esta práctica proporciona experiencias formativas para el docente, desarrollando nuevas habilidades y construyendo otros conocimientos para mejorar su praxis educativa.*

**ENSINO HÍBRIDO. ENSINO DE CIÊNCIAS. FORMAÇÃO DOCENTE.**

## Introduction

In the contemporary educational context, there is hybrid education defined by a training model through which classroom teaching activities (face-to-face) are combined with others carried out at a distance and supported by information and communication technology (ICT). Its purpose is to contribute to achieving the desired educational goals from the advantages offered by each environment, whether in the face-to-face modality with physical interaction, emotional bonding, activities of greater cognitive complexity and in the virtual one with cost reduction, displacement, accommodation, elimination of spatial barriers and temporal flexibility.

The impact of information and communication technology (ICT) tools in education takes on a particular aspect of a complex phenomenon related to the role of these technologies in today's society, which includes new ways of working, communicating, relating, to learn, to think, in short to live. It is a fact that this current society is based on the development of ICT and as a consequence of this development, we experience the imminence of a new technological paradigm, which is organized around information and communication technologies associated with profound social, economic, cultural and educational transformations. (Castells, 2000).

The learning process in blended learning developed by active methodologies, refer to integralizing practices capable of transposing students from the traditional common environment of the classroom to a place of decision-making, experimentation and awareness of more effective significant practices aimed at the social development of students. learners motivating them beyond content comprehension.

Thus, students develop as autonomous subjects and protagonists of their learning. To achieve the above feats, how should the identity, practice and teacher training of this facilitator (teacher) be

configured in this process, the guiding question of our research. The present work aims to: Understand, in general, the teaching role in hybrid education in the face of the demands of competences for the integral formation of science teaching in the current scenario.

Hybrid teaching, the solution pointed out at the moment to strengthen education, this is a fact with its active methodologies, it has been optimizing the teaching-learning process. The problem in question is the preparation of the teacher to meet these training demands and above all technological and personified at the same time, which skills need to be developed and what format of teacher training can meet these demands?

According to Haythornthwaite and Nielsen (2007) critical points about this modality: they restrict emotional, complex and expressive communications. They potentiate superficial social relationships and, at times, favor irresponsibility and lack of commitment. They allow verbal aggression, insults and different “isms” (racism, sexism, etc.). They favor the abandonment of local relationships. They tend to propagate and reinforce a more unstable, profane and mundane knowledge (infoxication). Given the above contexts, what educational purposes and attitudes would be necessary to promote blended learning?

And once again, the questioning is latent, the teacher is prepared for these interventions, it would be more work demands, in addition to what is inherent to the profession, the teacher will have working conditions for this, health, teaching identity we will continue with the reflections.

## **1 Theoretical foundation**

Theories about how people learn, according to Bransford, Brown and Cocking (2000), dialogue with the new vision of teaching. Regarding the three main conclusions on the science of learning identified by these authors, they address the importance of understanding the new role of the teaching-learning process.

As well as the relevance to develop research skills in students. Understand factual knowledge base and ideas in the context of a conceptual framework and knowledge organization in order to facilitate its application. Emphasizing that the learner needs to play an active role to signify and understand information according to their previous knowledge, building new knowledge and significant knowledge, knowing how to apply them in concrete real-life situations.

Therefore, the statements especially strengthen the relationship with the classroom, in which it should be rethought, as well as its structure and pedagogical approach. In this perspective, there are several proposals for alternative pedagogical practices, such as hybrid teaching, active methodologies, in which, instead of passive, banking learning based on the transmission of information, the student assumes a protagonist, participatory posture, in which he decides to problems (Freire, 1987). So, we are led to think: what are the paths in a didactic and dialectical environment in which the due autonomous understanding and the creation of collective spaces for the exchange of knowledge take place? In which active methodologies in the school environment are of broad responsibility, as each subject learns in one or several ways?

The teaching praxis, as Antônio Nóvoa (2001) states, is even more complex today, as the teacher deals with varied knowledge, with technologies and a social complexity, which is a consequence of the phenomena of globalization, the expansion of access to school, the cultural, social, economic and so on.

According to the author,

[...] when all students go to school, from all social groups, from the poorest to the richest, of all races and all ethnicities, when all these people are inside the school and when it is possible to comply, somehow, this historical design of the school for everyone, at the same time, too, the school reaches an enormous complexity that did not exist in the past. Today it is certainly more complex and more difficult to be a teacher than it was 50 years ago, than it was 60 years ago or 70 years ago. (Nóvoa, 2001 p. 25).

The author states that teacher training should be continued throughout the teacher's professional life and training actions should be organized by the teachers themselves. Furthermore, among the competences required for teaching practice, the following stand out: the competence of the organization. This concerns the ability to organize learning, including those that take place via information technology; organization of the class or classroom, that is, the teacher as the organizer of school work, in its various dimensions, promoting the organization as a professional community.

In 2002, Nóvoa endorses the need for the teacher to know how to organize and to know how to organize himself, being able to promote the organization of spaces for inter-peer learning, exchange and sharing, which represents more than the promotion of collaboration, but the inscription of the collective and collegial principles in the professional culture of teachers. Therefore, this organization should not only permeate traditional and union practices, but based on the professional community in a collective teaching bias, on the school floor with the performance of disciplinary groups/collectives that aim to play a role with a profession, which configures in a broader way, from the than the role that has been played so far.

According to the approach in question, we will focus, as Moran (2015) endorses, that active methodologies come as paths for educational change, as learning needs to be meaningful and go through school walls with learning contexts for life. These methodologies are seen as starting points for more advanced processes of reflection, cognitive integration, generalization, and the re-elaboration of new practices, surpassing traditional education and focusing on the student as the protagonist of his own knowledge, in a process that leads to motivation, involvement and dialogicity. Highlighting fundamental components of active methodologies based on the creation of challenges and activities, competency-based games with gradual levels that request relevant information with stimulating rewards associated with personal paths and meaningful experiences in groups, inserted in adapted platforms that provide student recognition and at the same time their interaction with colleagues and teachers making use of appropriate technologies that consequently will guarantee the success of these methodologies.

According to Valente (2014), the relevant movements of digital information and communication technologies (IDIC) have been providing, with regard to changes in distance education, which until the beginning of the years (1980) was based on printed material produced and sent to students, since then, several distance learning modalities have been created, including blended learning, which combines

classroom activities and distance educational activities, carried out through TDIC, called hybrid learning. Different ways of combining face-to-face and distance activities stand out, with the inverted classroom or flipped classroom being one of them. According to this approach, the content and instructions on a given curricular subject are not transmitted by the teacher in the classroom, it is up to the student to study the material in advance before attending the classroom, which becomes the place to learn actively, to be a protagonist. knowledge, carrying out problem solving activities or projects, discussions, laboratories, among others, having the teacher as a facilitator and support in the construction of knowledge in a collaborative way with colleagues.

According to authors Christensen, Horn and Staker (2013), blended learning is conceived through the lens of disruptive innovation theory to help people predict and plan for the likely effects of blended learning in today's classrooms and schools of tomorrow. Corroborates Moran (2015) about this disruptive innovation, however, highlights that one cannot keep the traditional model and think that with few adjustments it will work. There will be necessary, progressive and deep adjustments with a focus: active and not passive student, deep and non-bureaucratic involvement, guiding teacher and not transmitting.

Regarding blended learning and online education, several initial and continuing education initiatives for educators are relevant, which were modeled, developed and implemented through massive open online courses (MOOC), online courses and online and hybrid approaches (Philipsen, Tondeur, & Zhu, 2016).

Blended learning can be called in several ways, in this research we will address the definition of learning in a context of face-to-face and online interactions (Boelens et al., 2015). Among the various reasons for adopting training with a hybrid approach, we list below:

- A. teachers available in situations that make their presence impossible;
- B. bring the real context to the initial formation;
- C. enable peer feedback;
- D. formation of an intercultural and international community in the initial training and professional development of the educator;
- E. cost reduction in terms of scalability;
- F. possibility of developing, identifying and incorporating innovative practices in education;
- G. possibility of increasing access to quality education.

Owston (2018), in addition to the reasons already mentioned, highlights the greater empowerment of students in hybrid formations from the identification of four aspects:

- A. flexibility to choose when and where to participate in the online part of the training;
- B. student performance in hybrid courses tends to be better than fully online or face-to-face;
- C. self-efficacy and self-regulation tend to be higher in hybrid courses;

D. the level of student satisfaction with learning methods that use hybrid approaches.

These aspects in the development of reflective skills on national or international practices and innovations are essential in teacher training, in the most varied contexts they are configured as relevant successes in hybrid education. Due to the possibility of recording their practices in classrooms, and later sharing and reflecting with their peers and in a collaborative network with the possibility of making interventions and repackaging in eportfolios with reflections and learning management contexts that occur in African countries, in India and Latin American regions (Impedovo & Malik, 2019).

Research indicates that hybrid courses guarantee success when the course design is well planned, adapting activities in online and face-to-face scenarios (Littenberg-Tobias & Reich, 2018).

However, attention is needed for the need for quality support in face-to-face activities that will serve as steps for learning in online environments.

In this scenario of learning interactions, there is a significant audience of students who are attracted by the hybrid teaching modality, however, historically, the profile of students who perform better in online courses are those with greater educational experiences and more defined learning strategies ( Littlejohn et al., 2016).

The online teaching modality is called a set of methodologies, interactions, tools and knowledge that intentionally lead to learning, mediated by the internet. In need of an educational and learning design that coordinates the different experiences of the teaching-learning relationship. Taking into account the materials and technological tools that must meet the needs of students and different scenarios and learning objectives. Some essential requirements are: planning, organization and interdisciplinarity.

The design of this modality needs to be thought in order to justify the synchronous and asynchronous moments, online and offline and the technologies involved according to the learning objectives.

It's no use having a platform with services that the vast majority cannot access due to equipment or cost limitations.

According to Palenta et. al. (2020), the four central elements for a good online teaching design: the context, tools and resources, concrete tasks and the relationships between the three (interactivity of the tools, individualization of tasks and the type of teacher mediation from the resources ).

Some rules of the hybrid modality: consider the students' personal and contextualized objectives; ensure good communication; listening, explanation; identify students' needs; the modes of interaction; consider infrastructure and student access; use learning analytics; identify the different possibilities of different media and how to use them.

Face-to-face (effective, cognitive, social and learning) is important for teachers and students; distributed pedagogy, involvement of different stakeholders, building relationships.

In hybrid courses, the organization of learning includes not only the management of what happens in the face-to-face classroom, but also the management of events planned for the virtual learning environment.

## 2 Methodological Path

The context of the research was in the online universe through a questionnaire (google forms) with application of a questionnaire with 71 teachers in the area of science teaching (30 Biology teachers, 20 Mathematics teachers, 15 Chemistry teachers and 6 Physics teachers) to general position on the subject contains information on (type of institutions, discipline, use of technologies before and during the pandemic, platforms used, active methodologies used). Some speeches of the researched were used by sampling in general scope to endorse the conceptions of these teachers on the subject, the subjects will be designated by pseudonyms through the letter "P" followed by the numbering order "P1" (speech/contribution of the teacher-1) and so on, as a way of protecting their identities. Along with the application of the above tool (questionnaire) we sought to explore in an exploratory way the bibliographies and trends on the subject, which was very evident, due to the pandemic scenario and seen as an alternative way to the "new normal" of the educational context. The methodology of the present work is consolidated in an exploratory and descriptive research in a methodological path of qualitative bias. From this perspective of a qualitative approach, through which we sought to understand realities and their meanings. Not referring to quantification, but to values, attitudes, aspirations. In which an exploratory bibliographic survey was used, seeking to understand more about the process that took place, than the final product itself (Mynayo, 2011).

Focusing on the reflection on the findings and findings, based on Bardin's content analysis to strengthen new discoveries or affirm hypotheses, in line with the theoretical objective of the research: seeking to present active methodologies, specifically blended teaching and skills in teacher training for this teaching modality with interfaces in science teaching. Noting that content analysis, admits both quantitative and qualitative approaches, lends itself to both exploratory and verification purposes, confirming or not hypotheses or pre-established assumptions. Content analysis comprises three stages: a) preliminary analysis, b) material exploration, c) data processing and interpretation (Vergara, 2010).

## 3 Results and Discussion

In the research, the following data were indicated: greater participation of teachers from the public education network, presenting a percentage of approximately (84.3%). Frequent use (53.5%) of digital resources during the pandemic. Tools used and their respective percentages: Whatsapp (71.8%); then Google Meet, Classroom (56.3%), then Youtube (42.3%); specific platforms for teaching/other networks (38%), Zoom (28.2%); Facebook (11.3%); Instagram (9.9%) and, to a lesser extent, Skype (1.4%).

It points to a percentage of approximately (77.9%) of the importance of the gamification and playful strategy in the engagement of students in remote classes.

In view of the above data and the pandemic scenario, the teacher demonstrated the ability to adapt and even reinvent himself through his practice, making use of the various online tools and hybrid strategies in the teaching-learning processes.

Active methodologies in science teaching from the perspective of Paulo Freire, seeking to identify points of convergence, that is, of encounters between active methodologies and the educational concept Freirian. In this sense, we seek to dialogue with some digital platforms and tools, for remote work, involving the participant as an active subject of the training process. In order to discuss active methodologies that can be explored in science teaching, among these, how to bring problematization to science classes stands out? The surveyed teachers signaled:

P1: - Observe, arouse curiosity and create new interesting methodologies! P2: - I start with a dialogue, telling experiences.

P3: - It's nice, at this moment we talk about TB people, "Teaching is taking a risk", as Paulo Freire says

P4: - Dialogue is essential. So, through dialogue, we can identify situations that may favor the teaching-learning relationship and seek connections with disciplinary content. I'm not in the classroom anymore, but in the science clubs of the science and technology laboratory we always seek to dialogue and encourage our students with provocations.

P5: - Project Methodology.

P6: - conversations with students to understand what they know about the subjects, videos on youtube, quick activities on the internet such as questionnaires, recommendation of documentaries.

P7: - There is always a subject that comes up during Science classes. When I see the great interest, I look for videos and texts on the subject. Dealing with current affairs has also been very stimulating.

P8: - Launching questions that arouse curiosity

P9: - With challenges, with empathy, showing something relevant and debating with them. They interact a lot in my classes and learn, with the construction of both parts.

P10: - Using more attractive methods followed by a lot of interactivity between teacher and student, demonstrating the capacity for resilience among students, building a satisfactory environment through the difficulties encountered during remote classes. Elevate the dynamics of coexistence mediated in fruitful and welcoming feelings.

P11: - Associating the study of science with the daily life of students. Science is in everything, in our house, in our neighborhood, in us and in the Universe.

P12: - Practical classes arouse curiosity in students.

P13: - Arouse curiosity: Analyzing problem situations, carrying out experiments, promoting student participation.

P14: - I always try to bring it into their daily lives. Ask curious questions that get his attention. examples the super moon, among others.

What Freire said and the convergences with active methodologies and science teaching endorsing what the surveyed teachers said above:

- New teaching methodologies that focus on interaction between subjects (teacher/student, student/student, teacher/teacher);
- Protagonism, critical and autonomous posture of students.

Paulo Freire was one of the pioneers to problematize the concrete challenges that drove the articulation of popular movements towards the transformation of oppressive social realities. Therefore, working with active methodologies develops skills such as: critical thinking, teamwork, participation and creativity. These characteristics make learning more enjoyable and sustainable, by developing students' interest in discovering new knowledge.

Freire (2000) already idealized about this:

(...) Children need to grow in the exercise of this ability to think, to question themselves and to inquire, to doubt, to try out hypotheses of action, to program and not only to follow the programs, more than proposed to them, taxes. (Freire, 2000, p. 28)

The teacher must stimulate the development of critical thinking and reflection, in addition to improving student autonomy, focusing on their integral development, in line with the new demands emerging in this century, because in the teaching-learning process there is a need to respect the nature of each student's learning, taking into account their limitations and potentialities, due to education that is actually conscientious is one that problematizes, criticizes and prioritizes dialogue, respect, love, the act of creation and recreation, starting from the study "in cultural circle" of problem situations taken from the student's reality (Freire, 1987). The benefits of active methodologies that can promote optimization in science teaching:

- Autonomy;
- Ability to solve problems;
- Collaboration;
- Confidence;
- Protagonism;
- Critical sense;

- Engaging learning;
- Empathy;
- Responsibility;
- Participation.

However, mere training in the tools does not guarantee learning if it is not associated with the skills and competencies as endorsed by Souza (2019), listed below:

It is necessary to organize learning in blended learning through activities, description and organization of the pedagogically structured virtual learning environment in accordance with the collaboration of a multidisciplinary technical team with a focus on a format for how the contents and technological devices will be presented.

The dynamics of learning and didactic-pedagogical planning define how the classes should take place, carefully selecting which contents will be work in person and which will take place outside the classroom. In addition, the teacher must also be able to prepare the course plan and the plan for each class, considering the selection of the various technological devices that must be properly selected. According to the selection of technological devices and the aforementioned adaptations, the didactic situations proposed.

About the planning, proposition and mediation of the pedagogical activities including the execution time and space of the activities that will be carried out.

Monitoring of student access and participation through student monitoring reports, presenting information about classroom attendance and participation (considering quantitative and qualitative aspects).

Another relevant point is the procedural pedagogical assessment through the learning cycle of each student and the class, comparing results and issuing dialogued feedback.

With a greater purpose of constituting a collaborative learning community with the objective of supporting/mobilizing seeking to maintain closer ties between students and the field of knowledge studied. As well as, review and dynamic reaction to unforeseen events. Rethinking didactic-pedagogical practices and is prepared to react to unforeseen events, welcoming the learning styles and demands presented by students and the environment in which they are inserted (Souza, 2019).

## **Final Considerations**

Within what has been exposed, in a reflective bias, will the initial training, the continuing training, the HEIs, the public policies in education favoring teachers to meet the format above the demands of the new teaching model? Therefore, it is up to the regent teacher to analyze and contextualize what

actually adds value to their students, not giving up a flexible look so that the humanization of pedagogical practice is not lost, and so we come to more questions, will the teachers be prepared in their curricula for training and in their training processes to meet such demands, will hybrid teaching be the salvation, the remedy for a meaningful education or is the teaching performance the driving force of the process in this articulation. And what would be the skills and format of teacher training to meet hybrid teaching and its active methodologies? We tried to get closer to possible paths for this questioning, but we continue with the same question in an attempt to continue provoking discussions, questions, debates between peers and the academic community and far from exhausting the theme, but that it serves as an instrument for more scientific productions with this approach.

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