# Conceptual framework proposal based on a new taxonomy for Blended Learning: an approach to enhance and modernize education

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**Abstract:** Blended Learning, which gained prominence, especially after the COVID-19 pandemic, emphasized improving student learning, autonomy, and engagement. This research has a qualitative nature, based on a Systematic Literature Review, as a result of questioning the contribution of Hybrid Learning to student autonomy and engagement. Grouping and identification of five types of hybrid learning were carried out. Next, a taxonomic categorization was proposed for each blended learning cluster. The objective of this work was to propose five conceptual frameworks for Hybrid Learning to contribute to the work of teachers in applying them since teachers are fundamental in evaluating the educational tools available and choosing the correct hybrid teaching approach. This study aims to support future research on the implementation of hybrid teaching in Brazil.

**Keywords:** Blended Learning; Education Enhancement; Modernizing Education; Taxonomy Proposal; Classification; Conceptual Framework.

## Proposta de framework conceitual baseada em uma nova taxonomia para Blended Learning: uma abordagem para melhorar e modernizar a educação

**Resumo:** O Ensino Híbrido, ganhou destaque, especialmente após a pandemia da COVID-19, enfatizou o aprimoramento da aprendizagem, da autonomia e do envolvimento dos alunos. Esta pesquisa tem carater qualitativo, fundamentada por uma Revisão Sistemática da Literatura, fruto do questionamento da contribuição do Ensino Híbrido na autonomia e engajamento dos estudantes, foi realizado agrupamentos e identificação de cinco tipos de aprendizagem híbrida. Em seguida, foi proposto uma categorização taxonômica para cada cluster de aprendizagem combinada. O objetivo deste trabalho foi propor cinco frameworks conceituais para Aprendizagem Híbrida a fim de contribuir com o trabalho dos docentes na aplicação das mesmas, uma vez que os professores são fundamentais na avaliação das ferramentas educacionais disponíveis e na escolha da abordagem de ensino híbrido correta. Este estudo visa apoiar pesquisas futuras sobre a implementação do ensino híbrido no Brasil.

**Palavras-chave:** Aprendizagem Híbrida; Melhores práticas; Modernizando a Educação; Proposta de Taxonomia; Classificação; Frameworks Conceituais.

## 1. Introduction

In recent times, Information and Communication Technologies (ICT) have been increasingly used within the school context, at the most diverse levels of education (ESPINO-DÍAZ *et al.*, 2020). Most students nowadays have access to ICT in their daily lives, whether through their smartphones or those of their tutors, and this ends up reflected in the school context, where teachers frequently must seek strategies to engage this "connected" audience on the Internet (MARTIN, 2021). With the extensive dissemination of information online, substantial changes need to take place in the field of education (LOPES *et al.*, 2007).

Among these changes, Blended Learning (BL) is a teaching modality that gained a lot of visibility during the COVID-19 pandemic, as one of the options to maintain the teaching and learning process at different learning levels, cultures, and regions of Brazil and the world (MOREIRA; FERREIRA and LIMA, 2023). In its original definition, BL

is a teaching modality in which online and in-person classes complement each other, focusing on personalizing teaching, taking advantage of various digital technological resources, and enabling the student to learn on their own time. and at your own pace (BACICH; NETO and TREVISANI, 2015; BACICH, 2016).

However, even before the pandemic, the use of the hybrid modality had already gained popularity in recent decades, sometimes considered effective in promoting autonomy between different student profiles with the use of different ICT in educational systems (BOELENS; WEVER and VOET, 2017). In essence, BL involves combining face-to-face and online moments (JNR, 2022), However, in the last decade new blended learning models have been developed to optimize costs and strengthen the accessibility and flexibility of learning in educational institutions. (NWEKE *et al.*, 2022).

For this study, the following questions were asked: (i) Can the use of Hybrid Learning contribute to a more engaging learning experience for students?; (ii) Can the use of Hybrid Learning contribute to an autonomous learning experience for students?; and (iii) What evidence has been found that the use of Hybrid Learning in the classroom produces a more meaningful learning experience and greater autonomy for students? Based on these questions, using the State of Art (StArt) Tool (HERNANDES *et al.*, 2012; FABBRI *et al.*, 2016), we conducted a Systematic Literature Review (SLR) (MOREIRA and LIMA, 2023), based on works (KITCHENHAM *et al.*, 2009; KITCHENHAM *et al.*, 2010) and subsequently, in this work, we developed five frameworks to help teachers who want to work with BL in the classroom, which will be detailed later in this paper.

Therefore, the central objective of this research is to elaborate and present five conceptual frameworks, which will be explored in this article, to enrich and improve the BL modality. This collection of conceptual frameworks is based on an innovative taxonomy introduced in this study. Through this approach, we seek to provide practical and conceptual guidelines that may be valuable to educators and researchers interested in exploring the nuances of BL approach. We know that it is essential to recognize the critical role played by teachers in evaluating the educational tools available in their respective educational institutions and selecting the BL approach that best suits the demands of their student community. Therefore, the personalization of blended learning through the application of these frameworks proves to be fundamental to effectively meeting the educational needs of students.

## 2. Background

In this theoretical foundation section, we will present the definitions related to the topic in question, to clarify the concepts and foundations necessary to understand the subject. Firstly, we will briefly discuss the Framework concepts and then we will discuss BL approaches.

### 2.1. Frameworks definitions

The “framework” can be understood as the set of pre-defined techniques, tools, or concepts used to resolve an issue, in short, it is a work structure that works with pre-established functions that adapt to different situations (HULT *et al.*, 2011). We can say that the objective of this structure is to make research results more rigorous and meaningful, allow the development of theories, and ensure generalization.

Within the literature, we find some definitions, for (FAYAD; SCHIDT and JOHNSON, 1999) the framework consists of a set of abstract classes for solving a family of problems. It can also be understood as a pre-defined structure that aims to maximize the reuse of software components (MATTSSON, 1996). The framework consists of a set

of objects that interact to be responsible for a specific application or application domain (JOHNSON, 1997). Another definition tells us that the framework comprises the set of thoughts about a given problem, the methods, procedures, and instruments, and the analysis, recommendations, and conclusions to be made about something. (RAVITCH and RIGGAN, 2016). The framework uses concepts to organize knowledge, aiming to solve a specific problem, which can be used as a guide for the development, use, and testing of interventions (MACEDO and SOUZA, 2022). The conceptual framework can be defined as a network of interconnected concepts that together present a comprehensive understanding of a phenomenon or phenomena, thus each concept within a conceptual framework plays an epistemological role (JABAREEN, 2009).

### 2.2. Blended learning related works

The BL modality, or hybrid teaching, can be seen and applied in different ways depending on the structure and objectives of educators. For some, BL combines the traditional classroom with online moments, allowing students to access online content at any time and place. This model is the best known and used by many educators, as we can see in studies of (YANG and OGATA, 2022; PHELPS and MORO, 2022; CHEN, 2022; WONG, 2022; CHUA and ISLAM, 2021; AHLIN, 2020; SARTEPECI and CAKR, 2015; ETOM *et al.*, 2021; DARMAWAN *et al.*, 2021).

Another model that became very well known during the pandemic, is based on synchronous moments with the presence of the teacher through digital communication tools such as Google Meet and Zoom, which allowed educators and students to have their classes in real-time regardless of the situation. geographic location they were in, and the asynchronous activities carried out through digital platforms, which students could access whenever and wherever they wanted, as we can see in studies of (ARGYRIOU; BENAMAR and NOLOLAJEVA, 2022; AVRAMNKO *et al.*, 2021; SURDITHA *et al.*, 2022; RAHIM; KALAICHLVEN and IBRAHIM, 2022; AHMED *et al.*, 2022).

Some studies present blended learning carried out only within the school environment, that is, both classroom activities and online activities using technological equipment take place within the school space, therefore, there is a combination of moments in the traditional classroom, with the activities carried out through the use of different technological resources, both online and offline, as we see in studies of (LIMA; LAUTERT and GOMES, 2022; KUNDU; BEJ and RICE, 2021; INDRIYANTI; YAMATINAH and MUAWIYAH, 2020)

Team-based BL is a teaching strategy that aims to develop fundamental skills, such as student responsibility for acquiring their own knowledge and effective team collaboration. In this model, students participate in face-to-face classes with all the physical infrastructure, materials, and teacher mediation. Additionally, they engage in online activities carried out in teams, which can be made available through educational platforms. These activities are conducted through a sequence of online tasks, eliminating the need for students to be in the same geographic environment (SHEN *et al.*, 2022).

Blended Learning with tutoring is an approach that encompasses both face-to-face moments, in which face-to-face interactions occur in the classroom, providing an enriching learning environment with the active participation of teachers, colleagues, and various pedagogical resources. With online moments, however, the difference between this approach and the others mentioned above is intrinsically linked to the fact that, in activities carried out in the virtual environment, students have the opportunity to count on the valuable help and guidance of their teachers (CUI; ZHAO and ZHANG, 2022).

To provide a more in-depth understanding of the various types of blended learning

discussed in this research, we organized the articles by affinity based on analyses from the Systematic Literature Review (SLR) (MOREIRA and LIMA, 2023). First, based on a detailed reading, we clustered the works presented at SLR based on similarity. Through these similarities, we seek to group more similar works into the same group and dissimilar works into different groups. This approach resulted in the categorization of works into five distinct classes (taxonomy) of blended learning, each representing a specific type. For a more detailed view, the Table 1, provides a detailed and organized presentation of

Tabela 1. Summary of blended learning concepts.

| Authors | Definition |
|---|---|
| **Integrated Blended Learning (InterBL)** | |
| Yang e Ogata, 2022; Phelps e Moro, 2022; Chen, 2022; Wong, 2022; Chua e Islam, 2021; Ahlin, 2020; Sarıtepeci e Çakır, 2015; Etom et al., 2021; Darmawan et al,, 2021 | Blended learning combines face-to-face communication and online, incorporating different resources technological technologies in the structure of classes, allowing students explore topics and share experiences in person and online. |
| **Connected Blended Learning (ConBL)** | |
| Argyriou et al., 2022; Ahmed et al., 2022; Avramenko et al., 2022; Gede Sudirtha et al., 2022; Abdul Rahim et al., 2022; Fola-Adebayo, 2019 | Hybrid teaching is a combination of synchronous and asynchronous activities, which can occur via face-to-face and virtual learning platforms or in fully online formats. |
| **Intraschool Blended Learning (IntScBL)** | |
| Adams et al., 2020; de Brito Lima et al.,2022; Kundu et al., 2021; Indriyanti et al., 2020 | Blended learning combines classroom activities with computer-based learning, both online and offline. |
| **Team-based Blended Learning (TBasBL)** | |
| Shen et al.,2022 | Hybrid teaching consists of activities that can be carried out online, in groups or individually. |
| **Highly Tutored Blended Learning (HTutBL)** | |
| Cui et al., 2022 | Blended Learning, in this case, combines learning environments with the use of digital platforms and support from teachers in all environments. |

Source: Prepared by the authors.

the outcomes obtained in each of the five grouping classes, which we outline as a new specific taxonomy for the scope of BL, as detailed in the scope of this work. This can be considered a contribution to a more accurate understanding and classification of blended learning modalities.

## 3. Materials and methods

This work has a qualitative approach, characterized by a bibliographic analysis in search of a more in-depth understanding of the phenomenon under study. Its main objective is to expand knowledge about this phenomenon, adopting a methodology for exploring reality that aims to achieve deeper knowledge (GIL, 2008). The Frameworks that will be presented in the results were created based on an SRL created by (MOREIRA and LIMA, 2023). In this SRL we chose articles in English in order to have a broader view of Blended Learning in different parts of the world. The SRL was carried out based on the PRISMA protocol (Preferred Reporting Items for Systematic reviews and Meta-Analyses) (GALVÃO; PANSANI and HARRAD, 2015), which is a methodology used to establish procedures, such as the list of items that should be considered for the review (PRISMA check list).

Next, starting from the definitions outlined in the SRL (see Table 1), five conceptual frameworks were developed, adhering to the methodology proposed by (JABAREEN, 2009). According to this methodology, the process begins with mapping the data sources, followed by reading and categorizing the selected data. Thus, we identify the relevant concepts and proceed to the categorization, integration and synthesis of these concepts, culminating in the validation of the conceptual framework. Within this context, we follow a sequence of steps that unfold as follows: 1. First, the SRL was carried

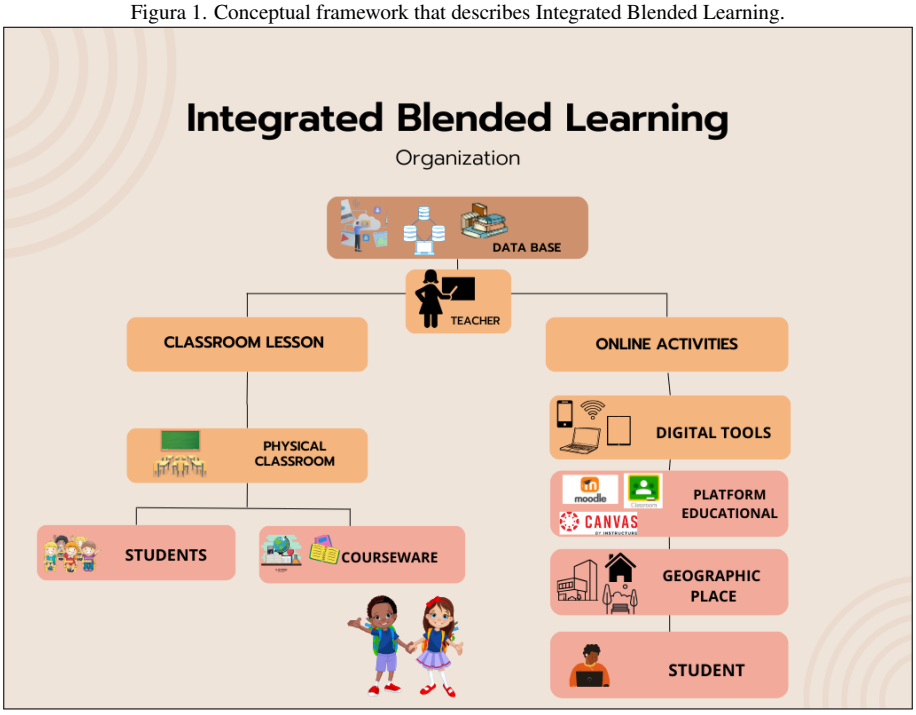
out, consisting of 21 articles from the last decade (2013 to 2022). 2. From the SRL, the Taxonomy (clustering) of the works was carried out by similarity, being five criteria were listed: (a) Authors; (b) Concepts; (c) Materials; (d) Methods; and (e) Definition. 4. Finally, after completing the previous methodological steps, we continue with the detailed description of each of the generated frameworks, providing an in-depth analysis of their characteristics and applicability from the perspective of BL methods. This sequence of methodological procedures, as detailed, reveals the depth and scope of the process, addressing not only the analysis of the model in terms of its meaning and relevance for the researcher, but also extending this evaluation to possible third parties interested and involved in the context. from the project. to study.

## 4. Results

Based on the concepts of BL that emerged from our preliminary research, we identified and categorized five classes, which we call for a better understanding as: (i) Integrated Blended Learning; (ii) Connected Blended Learning; (iii) Intraschool Blended Learning; (iv) Team-based Blended Learning and (v) Highly Tutored Blended Learning. These categories reflect the different approaches and contexts in which BL is being applied, providing a clearer framework for understanding and analyzing BL practices. From each of these classes, we developed a conceptual framework to help teachers and managers in planning and adopting BL in the classroom.

The first conceptual framework developed seeks to describe Integrated Blended Learning (InterBL), in short, in this modality, the teacher, based on his/her planning, searches for content in databases, organizes classes in two distinct moments, as shown in Figure1, thus it combines traditional structures such as classroom physics, blackboards,

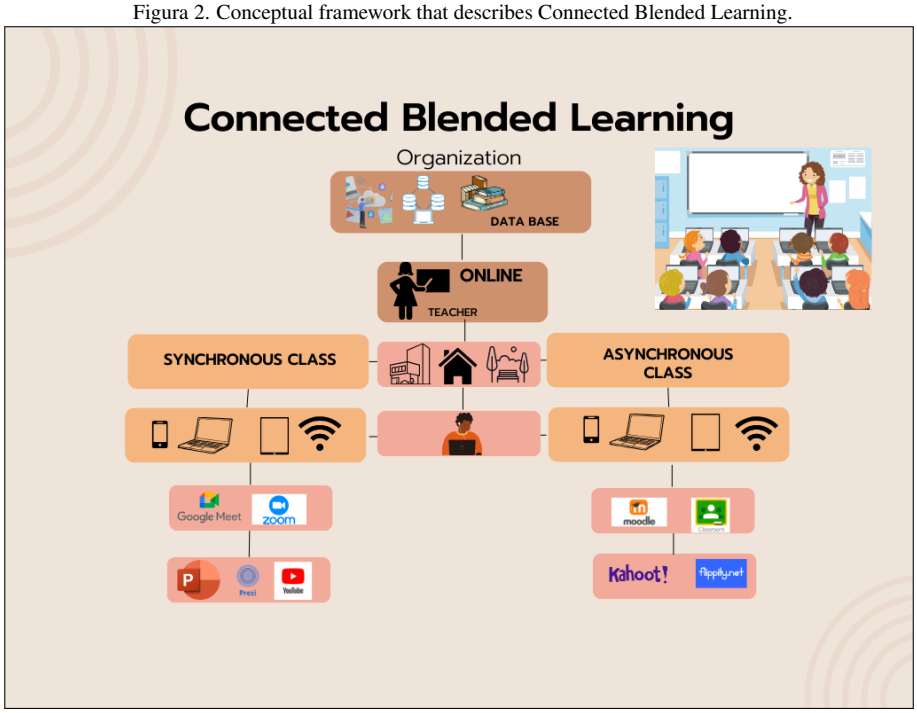
Figura 1. Conceptual framework that describes Integrated Blended Learning.




Source: Prepared by the authors.

and books, among other materials, in which the teacher is the mediator of the contents to be discussed and worked on in the classroom. This traditional structure is integrated with online activities through tools such as Moodle, Google Classroom, and Microsoft

Figura 2. Conceptual framework that describes Connected Blended Learning.



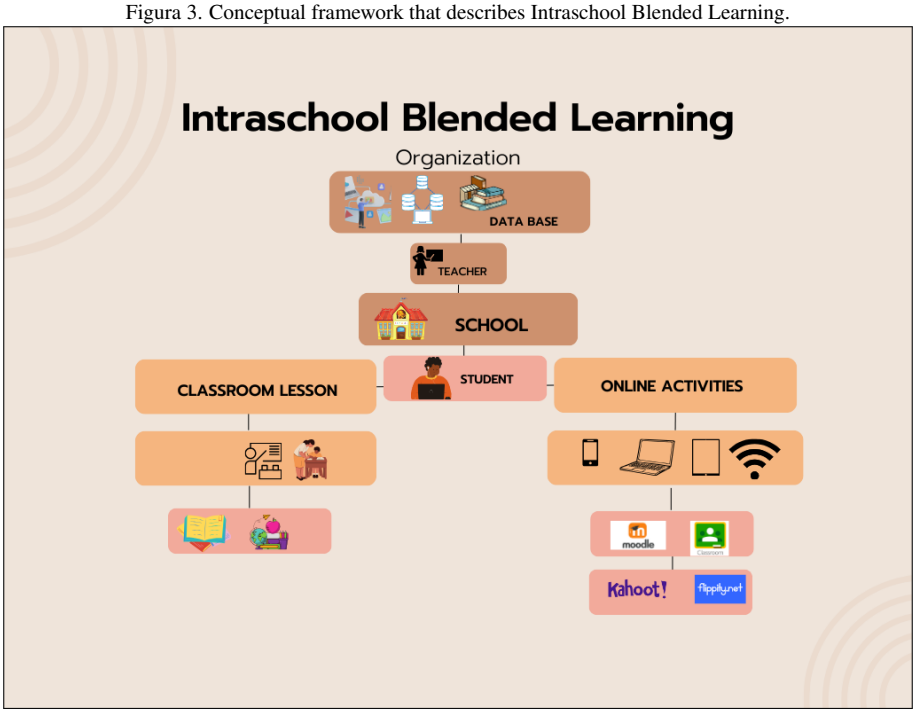

Source: Prepared by the authors.

Teams, among other platforms that students can access at any time and place and develop the proposed activities. This flexible and versatile teaching model fosters student autonomy and enhances the learning experience by enabling them to conveniently access educational resources, be it in school, at home, or anywhere else with internet connectivity and access.

Our second conceptual framework seeks to describe Connected Blended Learning (ConBL), in which the use of the internet is necessary, in it we can see that there is a combination of synchronous and asynchronous moments through the use of technological equipment such as Smartphones, Tablets, Computers, and others. Based on structured planning, synchronous moments are similar to physical classrooms in terms of the presence of the teacher as a mediator, providing support during the presentation of content to be worked on in class, answering questions, and helping students during classes. Asynchronous moments include activities available through digital platforms such as Moodle, and Google Classroom, among others, as we can see in Figure 2. In this context, students can access learning materials, such as presentations, readings, and assignments, autonomously and flexibly, allowing each person to follow their own pace and study schedule. This promotes independence and the ability to manage your learning time according to your individual needs.

The third conceptual framework proposed here seeks to describe Intraschool Blended Learning (IntScBL), in which both face-to-face and online activities are carried out within the school environment, as illustrated in Figure 3. In this way, based on planning, the teacher proposes activities to students in a traditional classroom, in which the teacher plays a mediating role, using resources such as textbooks, blackboards, and other teaching materials. In addition, students also engage in activities through the use of computers, tablets, and other devices in the computer laboratory, which can be fixed or mobile. During these moments, students have the autonomy to carry out the activities, respecting their own learning pace to complete each task. For these activities, educational

Figura 3. Conceptual framework that describes Intraschool Blended Learning.

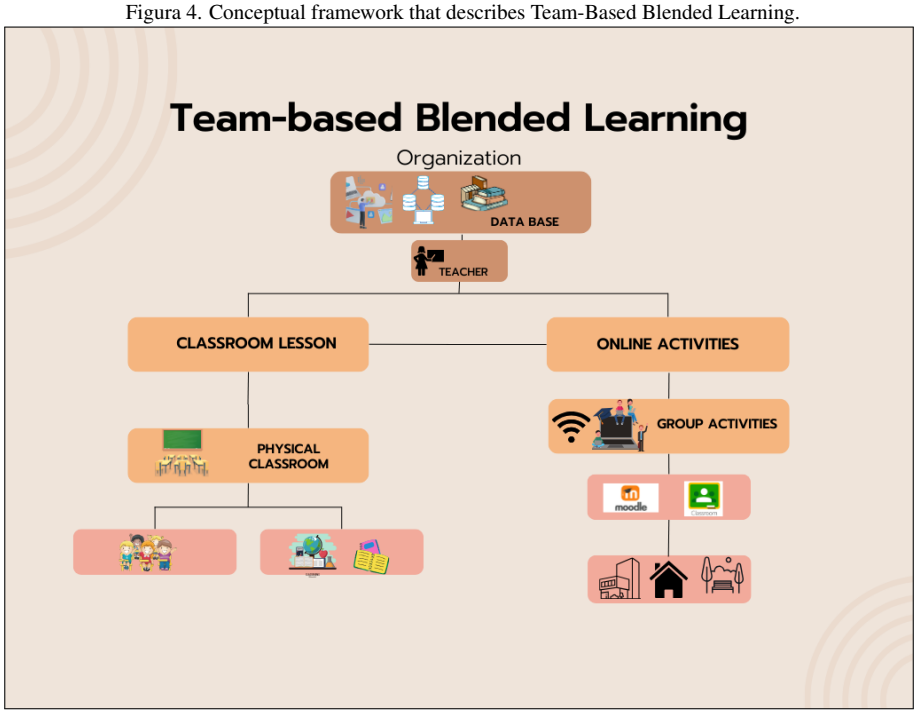



Source: Prepared by the authors.

platforms and gamification tools can be used, such as Flippity and Kahoot, among others.

Our fourth conceptual framework seeks to describe Team-Based Blended Learning (TBasBL), in this model, as illustrated in Figure 4, According to the teacher's planning, students participate in face-to-face classes with all the physical infrastructure, materials, and teacher mediation. The difference is that during online activities, the tables

Figura 4. Conceptual framework that describes Team-Based Blended Learning.



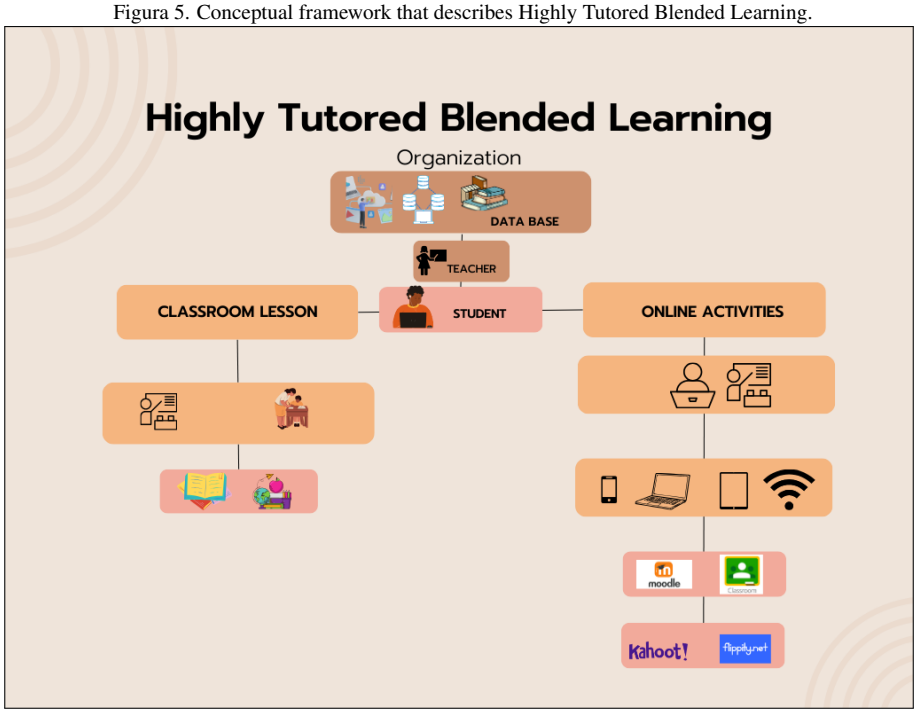

Source: Prepared by the authors.

are held in teams, which can be made available through educational platforms such as

Teams, and Moodle, among others. These activities are conducted through a sequence of online tasks, eliminating the need for students to be in the same geographic environment.

Our fifth and final conceptual framework seeks to describe Highly Tutored Blended Learning (HTutBL), which, as previously described based on planning, the teacher develops activities both in face-to-face moments, in which face-to-face interactions occur in the physical classroom, providing an enriching learning environment with the active participation of teachers, colleagues, and diverse pedagogical resources. Additionally, the modality also covers moments of online learning, which are made possible through specialized digital platforms, as clearly illustrated in Figure 5. The

Figura 5. Conceptual framework that describes Highly Tutored Blended Learning.




Source: Prepared by the authors.

difference between this approach is intrinsically related to the fact that, in activities conducted in the virtual environment, students have the opportunity to count on the valuable assistance and guidance provided by their teachers. This symbiotic relationship between educators and students makes it possible to build an environment that favors student autonomy, in addition to offering a solid support structure during the execution of tasks on digital platforms. This approach mitigates the possibility of feelings of frustration, which becomes even more relevant for students who have more limited prior knowledge regarding the technological tools used. In this context, it is essential to highlight that students have the advantage of enjoying continuous monitoring and qualified feedback provided by teachers throughout the entire educational journey.

The Table 2 is a valuable tool that presents a comprehensive synthesis of the essential characteristics and key elements related to the concept of blended learning. It offers essential insights to guide the development and successful implementation of each of the conceptual frameworks discussed in this work. This table acts as a comprehensive guide, providing clarity and direction for educators, researchers, and other interested parties who want to explore and apply innovative blended learning approaches. It highlights the main parameters that deserve special attention when designing and adapting educational strategies that incorporate blended learning.

Tabela 2. Overview of the key features and elements for BL and highlights the relevant parameters that should be considered when developing or implementing each of the conceptual frameworks.

| Framework | InterBL | ConBL | IntScBL | TBasBL | HTutBL |
|---|---|---|---|---|---|
| **Learning Objectives** | Autonomy<br>Engagement<br>Decision making | Autonomy<br>Time management<br>Encourage reflection | Autonomy<br>Participation<br>Responsibility | Collaboration<br>Integration<br>Autonomy | Encourage participation<br>Reflection<br>Problem solving |
| **Technology Integration** | Zoom, Moodle, MOLE, Classroom, BookRool and others. | Moodle, Teams, Zoom, Meet and others | Winsteps, Applet, Moodle and others | Meet, Moodle, Kahoot and others | Platforms developed to provide support, such as for example WISE. |
| **Teaching Modalities** | Face-to-face and online activities | Synchronous and asynchronous | In-person with online and offline activities within school | Individual face-to-face and online activities in group | In-person and online activities with tutoring from teachers |
| **Instructional Design** | In-person classes within the physical school space and online activities carried out through digital platforms. | Synchronous classes through videoconferencing tools and online activities through digital platforms. | Face-to-face classes within the school space and online activities carried out in the laboratory fixed or mobile within the school environment | In-person classes within the physical school space and online activities carried out in work groups without students being in the same geographic space. | In-person classes within the physical school space and online activities carried out with the support of a tutor to resolve doubts and provide the support necessary during the activities. |
| **Technical Support** | Qualified teachers | Qualified teachers | Computer teacher to provide support in the computer laboratory | Qualified teachers | IT teacher or technical tutor to provide support for online activities |
| **Student Engagement** | Short videos;<br>Promotion of debates;<br>Survey of previous knowledge, etc. | Gamified activities<br>Relate the content taught with everyday subjects, etc. | Gamified activities;<br>Work with learning stations<br>Troubleshooting; etc. | Create an environment of respect and cooperation between students;<br>Problem solving; etc. | Problem solving;<br>Learning trails;<br>Games; etc. |
| **Assessment** | Continuous feedback | Continuous assessment and adjustments | Formative assessments | Formative and summative assessments | Online Continuous feedback |
| **Accessibility and Equity** | Guarantee access to the internet and digital tools, for all students. Develop activities that allow the inclusion of everyone, regardless of their abilities and learning levels. | Guarantee equipment with access to the internet and digital tools for all students. Develop activities that allow the inclusion of everyone, regardless of their skills and learning levels | Ensure equipment in good working order for all students. Design activities that allow the inclusion of everyone, regardless of their abilities and learning levels | Guarantee access to the internet and digital tools, for all students<br>Develop activities that allow the inclusion of everyone, regardless of their abilities and learning levels | Guarantee access to the internet, tutoring and digital tools, for all students<br>Develop activities that allow the inclusion of everyone, regardless of their abilities and learning levels |
| **Data and Analytics** | Trails and learning | Questionnaires | Digital tools | Questionnaires | Amount of access and resolution of activities within the platform developed. |
| **Impact Assessment** | Questionnaire based likert scale | Questionnaire based likert scale | Feedback | Self-assessment and group assessment | Questionnaire based likert scale |
| **Good Habits** | Meaningful face-to-face interaction | Supplementary online resources | Meaningful face-to-face interaction | Online group collaboration tools | Online complementary resources and meaningful face-to-face interaction |

Source: Prepared by the authors.

## 4.1. Discussion

Various blended learning approaches offer many opportunities to combine in-person and virtual interactions, creating more personalized, flexible, and effective educational strategies. Integrated blended learning combines the traditional classroom with online activities, allowing flexible access to content anytime, anywhere, with in-person and virtual interactions (BARCELOS and BATISTA, 2019). During the COVID-19 pandemic, connected blended learning gained prominence, involving synchronous moments with teachers and asynchronous activities on digital platforms (SENDACZ; ISOTANI and LIMA, 2023). The intra-school technique combines face-to-face and online activities in the school environment, thus maximizing the learning experience. Team-based learning encourages collaboration and responsibility skills, while highly tutored blended learning emphasizes the essential role of teachers in physical and digital environments, providing rich experiences and ongoing support for students. It is worth mentioning that through BL, we can learn better through activities, games, problems, and projects, combining collaboration and personalization (MORAN, 2015). In this sense, the classroom becomes a place for active learning, through carrying out problem-solving activities or projects, and discussions, with teacher support for teaching and collaboration with colleagues. (VALENTE, 2015).

It is important to mention that for the successful application of each of the frameworks, investment in equipment, teacher training, and access to quality internet within the school space is necessary (LIMA and ISOTANI, 2022). Check whether students have access to technological equipment with internet access outside the school

environment. Furthermore, a limitation to be highlighted is in relation to the latest framework "Highly Tutored Blended Learning" which in its particularity requires the school to invest not only in equipment and internet, but in its professional staff, with dedicated teachers so that they have the availability of time to assist their students during their doubts when carrying out online activities.

## 5. Conclusions

The main contribution expected from this work focused on education was to propose frameworks for the application of BL in different school contexts, which focuses on promoting learning through hybrid activities, aiming to enable its application. It is essential to note that the results presented here are not just a superficial checklist; on the contrary, they offer a comprehensive and in-depth view of each parameter, considering the complexity of integrating technology and pedagogy in the context of blended learning. The results presented here were theoretically based on the SRL articles from our precursor work. Furthermore, the parameters presented in our work addressed crucial aspects such as specific learning objectives, effective technology integration, diverse teaching modalities, instructional design, technical support, student engagement, assessment methods, accessibility, equity, data analysis, and impact assessment. By exploring each parameter proposed here, education professionals will have a deeper and more structured understanding of BL, which, in turn, will help plan and implement more effective BL strategies. This table is a valuable resource for promoting a more dynamic and effective education, aligned with the demands of the 21st century and the needs of contemporary students.

For future work we intend to include the practical implementation of each of the conceptual frameworks outlined in this work. We intend to explore its applicability, evaluating both its strengths and possible limitations in different school contexts. We recognize that schools from different networks, whether municipal, state, or federal, and belonging to both the public and private systems, have different characteristics and, as a result, can demonstrate significant variations in the results achieved with the implementation of BL strategies. Therefore, our goal is to conduct comprehensive research that considers this diversity of educational environments, to understand how conceptual frameworks adapt and respond effectively to these specific variables. We believe this approach will allow us to gain a deeper understanding of the nuances of BL and identify personalized strategies to meet the needs and challenges of each school context. Our future efforts aim to significantly contribute to the improvement of BL by providing practical insights and evidence-based recommendations. By addressing both public and private schools, our research has the potential to enrich the quality of blended learning across the educational spectrum, promoting a more effective and inclusive learning experience for all students, regardless of their specific school context.

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