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Systematic literature review on the impact of Blended Learning in promoting student engagement and autonomy: findings and recommendations

Título: Revisão sistemática da literatura sobre o impacto do Ensino Híbrido na promoção do engajamento e autonomia dos estudantes: descobertas e recomendações

Título: Revisión sistemática de la literatura sobre el impacto de la Enseñanza Híbrida en la promoción del compromiso y autonomía de los estudiantes: hallazgos y recomendaciones

Franciely Pereira Moreira
Programa de Pós-Graduação em Educação Tecnológica (PPGET) – Instituto Federal de Educação, Ciência e Tecnologia do Triângulo Mineiro (IFTM) Campus Uberaba
ORCID: 0000-0001-5165-132X
franciely.pmoreira@gmail.com

Danielli Araújo Lima
Laboratório de Inteligência Computacional e Robótica (LICRo), Programa de Pós-Graduação em Educação Tecnológica – Instituto Federal do Triângulo Mineiro (IFTM) Campus Patrocínio
ORCID: 0000-0003-0324-6690
danielli@iftm.edu.br

Abstract

Education has been transformed due to the insertion of Information and Communication Technologies (ICTs) within the school environment. Among the methodologies used by educators, Blended Learning has been considered, which enables greater flexibility, autonomy, and engagement of students. This article presents the results of a literature review to better understand how the application of Hybrid Learning can contribute to student autonomy and engagement, as well as whether it produces more meaningful learning for students. In our research, 21 articles published in the last decade were evaluated, with 50% published in the year 2022, 30% of the articles published in 2021, and 20% published between the years 2015 to 2020, which provided us with a more recent critical view of the literature. Authors generally evaluated the use of Blended Learning positively regarding student engagement, autonomy, and more significant learning. Studies have shown that the inclusion of technology in the classroom, such as Moodle, Teams, Zoom, Kahoot, and Canvas, can improve teacher-student interaction. Additionally, the creation of engaging learning scenarios, support and interaction with students, and encouragement to carry out weekly activities were crucial factors for success in blended learning. However, the review also revealed limitations such as a limited number of studies from South American countries and a lack of standardization in the definition of blended learning. The findings allowed the creation of a guide with recommendations for teachers regarding the use of blended learning, and suggest that blended learning has the potential to improve student engagement and autonomy.
Keywords: *Systematic literature review; Blended learning; Student engagement and autonomy; Recommendations for teachers; Active methodologies.*

Resumo

A educação tem se transformado devido a inserção das Tecnologias de comunicação e informação (TIC) dentro do ambiente escolar. Dentre as metodologias utilizadas por educadores tem sido o Ensino Híbrido que possibilita uma maior flexibilidade, autonomia e engajamento dos discentes. Este artigo apresenta o resultado de uma revisão da literatura no intuito de entender melhor como a aplicação do Ensino Híbrido pode contribuir para a autonomia e engajamento dos alunos, assim como se ela produz um aprendizado mais significativo para os estudantes. Em nossa pesquisa, foram avaliados 21 artigos publicados na última década, sendo 50% publicados no ano de 2022, 30%

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dos artigos foram publicados em 2021 e 20% foram publicados entre os anos de 2015 a 2020, o que nos possibilitou uma visão crítica mais recente da literatura. Os autores de forma geral avaliaram o uso do Ensino Híbrido de forma positiva em relação ao engajamento, autonomia e aprendizagem mais significativa dos estudantes. Os estudos demonstraram que a inclusão da tecnologia em sala de aula, tais como, Moodle, Teams, Zoom, Kahhot e Canvas, podem melhorar a interação professor-aluno. Adicionalmente, a construção de cenários envolventes de aprendizagem, o suporte e a interação com os alunos e o incentivo à realização de atividades semanais foram fatores cruciais para o sucesso no ensino híbrido. No entanto, a revisão também revelou limitações como um número limitado de estudos de países da América do Sul e falta de padronização na definição de ensino híbrido. As descobertas permitiram que fosse criado um guia com recomendações para professores quanto ao uso do ensino híbrido, e sugerem que o ensino híbrido tem o potencial de melhorar o envolvimento e a autonomia do aluno.
Palavras-chave: *Revisão sistemática da literatura; Ensino híbrido; Engajamento e autonomia discente; Recomendações a professores; Metodologias ativas.*

Resumen

La educación se ha transformado debido a la inserción de las Tecnologías de comunicación e información (TIC) dentro del ambiente escolar. Entre las metodologías utilizadas por los educadores ha sido el Enseñanza Híbrida que posibilita una mayor flexibilidad, autonomía y engajamiento de los discentes. En este trabajo realizamos una revisión de la literatura con el fin de entender mejor cómo la aplicación del Enseñanza Híbrida puede contribuir a la autonomía y engajamiento de los alumnos, así como si produce un aprendizaje más significativo para los estudiantes. En nuestra investigación, se evaluaron 21 artículos publicados en la última década, siendo el 50 % publicados en el año 2022, el 30 % de los artículos fueron publicados en 2021 y el 20 % fueron publicados entre los años 2015 y 2020, lo que nos permitió tener una visión crítica más reciente de la literatura. Los autores evaluaron de forma general el uso del Enseñanza Híbrida de manera positiva en relación al engajamiento, autonomía y aprendizaje más significativo de los estudiantes. Los estudios demostraron que la inclusión de tecnología en el aula, como Moodle, Teams, Zoom, Kahoot y Canvas, puede mejorar la interacción entre el profesor y el alumno. Además, la construcción de escenarios envolventes de aprendizaje, el apoyo y la interacción con los alumnos y el estímulo a la realización de actividades semanales fueron factores cruciales para el éxito en la enseñanza híbrida. Sin embargo, la revisión también reveló limitaciones, como un número limitado de estudios de países de América del Sur y la falta de estandarización en la definición de enseñanza híbrida. Los hallazgos permitieron la creación de una guía con recomendaciones para los profesores sobre el uso del enseñanza híbrida, y sugieren que el enseñanza híbrida tiene el potencial de mejorar el envolvimiento y la autonomía del alumno.
Palabras clave: *Revisión sistemática de la literatura; Enseñanza híbrida; Participación y autonomía de los estudiantes; Recomendaciones para profesores; Metodologías activas.>*

1 Introduction

Information and Communication Technologies (ICT) has become an increasingly constant reality in the classroom. According to (Soares e Vieira, 2021) hybrid education is not a new approach in education, but it has gained prominence in recent years due to the evolution and popularization of Digital Information and Communication Technologies (TDIC) and, although the digital space is fundamental, the primordial thing in this process is the creativity of the teacher and his ability to guide the proposed activities.

Second (MacDonald, 2017) blended learning (BL) emerged in the United States and Europe as a way to solve the problem of school dropout by distance learning students, caused precisely by the feeling of abandonment they felt in the face of the teaching and learning process. And with time, the blended learning starts to compose the Active Methodologies.

In the view of Moran, 2018, the active methodologies emphasize the protagonist role of

the student, his direct, participatory, and reflective involvement in all stages of the process, experimenting, designing, creating, with the teacher's guidance. Therefore, blended learning is an active methodology in which face-to-face and online classes complement each other, focusing on personalized teaching using various digital resources, in which the student can learn at their own pace and time. (Bacich et al., 2015). Since the emergence of the COVID-19 pandemic de Freitas Vieira e da Silva, 2020, blended learning has become more widespread in Brazil, generating broader discussions about its implementation.

The BL is a type of learning that combines traditional face-to-face teaching with distance learning via the Internet and allows students to explore topics and share their experiences in person and online (Lima et al., 2017). Blended learning allows learners to see, hear, feel, and interact with teachers, peers, and learning materials de Oliveira Alves et al., 2020. Thus, blended learning, without the loss of face-to-face interaction in learning activities, supports the teaching-learning process at different times and places, offering some conveniences provided by online learning (Lima e Isotani, 2022).

For Moran, 2015 through BL we can learn better through activities, games, problems, and projects, combining collaboration and personalization. In this sense, each student develops a more individualized learning path, when we adopt methodologies in which they are involved in a more complex way, being challenged in activities that require decision-making and evaluation of results. So, second Valente, 2015, the classroom becomes a place of active learning, carrying out activities or problem-solving projects, and debates, with the support of the teacher and in collaboration with colleagues.

The use of Hybrid Education, became part of the Brazilian educational curriculum, according to the Ministry of Education (MEC), through MEC Ordinance No. 865, of November 8, 2022, implemented the Innovation Network for Hybrid Education, with the purpose of "to promote the implementation of blended education strategies by all federal entities in the country, as well as to contribute to the implementation of the New Secondary School equivalently and effectively". In addition, the creation of an observatory is also planned to promote the integration and monitoring of activities carried out in the Network, as well as monitoring the capacity of state and district education departments in offering hybrid education.

The purpose of this article is to carry out a systematic literature review (SLR), a methodology that provides us with a rigorous review of research results. Therefore, the objective of an SLR is to gather similar studies, critically analyzing them in their methodology and bringing them together for a qualitative and quantitative analysis. In addition, based on the SLR studies and findings, we intend to develop a set of recommendations to support teachers' lesson planning in blended learning.

This article is divided into six sections as follows, (1) the Introduction presents a brief concept about Blended Learning, (2) Methodology brings the applied research method being subdivided into (2.1) Planning, (2.1.1) Protocol and (2.1.2) Definition of the database, (2.2) Execution divided into (2.2.1) Identification of studies, (2.2.2) Selection and (2.2.3) Extraction, (2.3) Summary that was subdivided into (2.3 .1) Visualization of data and (2.3.2) Completion of the Review, (3) Results presents a summary of the articles, (4) Discussion talks about the evidence found, (5) Lessons learned subdivided into (5.1) Answers to Questions of Research, (5.3) Recommendations for Teachers and (5.3) Limitations, finally (6) Conclusion presents a closure of the discussed ideas and future work.

2 Methodology

The methodology used to investigate this research was SLR, for which we used articles from the last decade in the period from 2013 to 2022. We opted for articles in English since most of the works carried out in this area were written in English.

this SLR, it was based on the PRISMA protocol (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), which is a methodology used to establish procedures, such as the list of items that must be considered for the review (PRISMA checklist). Second Galvão et al., 2015, to guide and assist researchers in the transparency of the results of systematic reviews, an international group composed of methodologists, clinicians, and scientific journal editors created the methodological tool PRISMA. From the structured protocol, we use the State of Art application (StArt[1]) Tool (S. Fabbri et al., 2016; S. C. Fabbri et al., 2012; Hernandes et al., 2012). to help us with this SLR, which was based on the systematic mapping pointed out in the work of (Kandlhofer e Steinbauer, 2016; Kitchenham et al., 2009), According to researchers, the purpose of an SLR is not only to aggregate all existing evidence on a research question but also to support the development of evidence-based guidelines for practitioners.

2.1 Planning

In this section, the protocol that was used to carry out this research will be presented. Considering the SRL on blended learning in promoting student engagement and autonomy, we will present in this section the research plan, which includes the protocol used to research the effectiveness of blended learning in the educational context. We will also present the definition of the research objectives and the definition of the databases. We hope that the detailed presentation of the design used in this SRL can provide valuable information for researchers interested in investigating the effects of blended learning in promoting student engagement and autonomy in different educational contexts. To assist us in the SRL we use a support platform called State of Art (StArt).

2.1.1 Protocolo

At this stage, we created the research questions (RQ) addressed in this study, based on the concern to understand the relevance of BL as a teaching modality in the public network and whether its practice can make teaching more meaningful. Soon these concerns were used to categorize the works. Thus, for this study, four research questions were formulated:

RQ1 Can the use of Blended Learning contribute to learning with greater engagement for students?

RQ2 Can the use of Blended Learning contribute to students' autonomous learning?

RQ3 What evidence did you find that the use of Blended Learning in the classroom produces more meaningful learning and greater autonomy for students?

[1] StArt (State of the Art through Systematic Review) developed by the Software Engineering Research Laboratory of the Federal University of São Carlos (UFSCAR). Access link: http://lapes.dc.ufscar.br/tools/start_tool.

RQ4 What was the impact of the technological tools that were used to support blended learning for more meaningful student learning?

Therefore, the purpose of the questions above is to understand whether the use of Blended Learning can contribute to learning with greater engagement on the part of students. In this sense, our specific objectives (SO) are:

SO1 Define what is meaningful learning for students of different educational levels in the context of blended learning;

SO2 Understand the definition of student engagement at different educational levels;

SO3 Understand what is student autonomy in the context of blended learning;

SO4 Find the technological applications and information and communication technologies that are part of blended learning.

From the delimitation of the RQ and SO, a search string was constructed. For this purpose, four main concepts were chosen to define the terms, which are "Education", "Blended Learning", "Autonomy" and "Student". In this sense, we have a set of words (dictionary) to compose the search string formed by the different combinations of the radicals of each of these 4 terms. The search string was defined from the main terms in English and their synonyms, being defined as follows: "((education `OR` learning `OR` pedagogic) `AND` (blended `OR` blending `OR` hybrid) `AND` education) `OR` active methodology `OR` flipped learning) `AND` (autonomy `OR` engagement `OR` cognition) `AND` (student `OR` "middle school" `OR` elementary school `OR` basic education) `AND` (method `OR` methodology `OR` approach))".

2.1.2 Database definition

The articles selected for this Systematic Literature Review were collected from several databases, including (i) Scopus, (ii) IEEE, (iii) Web of Science, (iv) Scielo, and (v) Engineering Village. These databases were chosen due to their recognized relevance in disseminating high-quality scientific articles in various areas of knowledge. From these sources, systematic and careful searches were carried out to ensure that the articles included in this SRL were relevant and up-to-date about the topic of interest. Thus, for a better selection of articles, inclusion criteria (IC) and exclusion criteria (EC) were established. Inclusion and exclusion criteria are established rules to determine which studies or participants will be included or excluded from a search or systematic review. Inclusion criteria are characteristics that studies or participants must have to be considered relevant to the research in question. On the other hand, exclusion criteria are characteristics that, if present in studies or participants, make them unsuitable for the research in question. Kitchenham et al., 2009. A clear and precise definition of the inclusion and exclusion criteria is essential to guarantee the validity and reliability of the research results, in addition to allowing the review to be carried out systematically and objectively. In this sense, five ICs and five ECs were proposed for this SRL:

IC1: Addresses with the search string,

IC2: Studies in English,

IC3: Full peer-reviewed papers published in journals and conferences,

IC4: Theoretical or practical studies,

IC5: Articles from the last decade 2013 to 2022.

EC1: Secondary studies,

EC2: Grey literature,

EC3: Short papers,

EC4: Outside selected dates,

EC5: Out of scope.

2.2 Execution

The execution phase of the SRL is divided into three main parts. Thus, in this phase, we carry out the (i) identification of the study, (ii) selection, and (iii) extraction of the articles found in the aforementioned databases. For a better understanding and analysis, we have divided this section into three subsections.

2.2.1 Studies Identification

In this phase, the five databases were selected for the extraction of articles. In the initial phase of this study, five relevant databases were chosen to collect articles related to the topic of interest. In all, 2,241 articles were identified and underwent an initial review. In the figure 1, presented in pie chart format, it is possible to visualize the distribution of these articles in the different databases. Most of the articles were found in Scopus (35%), followed by Web of Science (32%), Engineering Village (17%), IEEE (8%), and Scielo (8%). These initial data allowed a more detailed evaluation of the articles and the selection of the most relevant studies for the Systematic Literature Review.

2.2.2 Selection

After identifying the 2241 articles, we carried out the selection phase to refine the screening of articles, at this stage after reading the titles, keywords, and abstracts we detected that many articles were out of scope and did not meet the inclusion criteria. For example, articles that were not focused on students, or articles related specifically to the health area, due to COVID-19, not having any familiarity with the research questions of this SRL, or short articles. In this sense, after careful reading, 103 articles were selected. As we can see in Figure 2 in the form of a pie chart.

The 103 articles selected as accepted were classified with the help of StArt, defining a reading priority classification. Thus, 2063 articles were already rejected and 75 duplicate articles continued to have very low reading priority as they did not pass any of the selection criteria, 82 articles had a low rating, 18 articles were classified as high reading priority and 3 articles were classified with very high read priority.

2.2.3 Extraction

At this stage, we extracted the 21 articles that make up this SRL, so, for a better understanding of the step-by-step process to reach the 21 articles that make up this work, we created the Figure 3

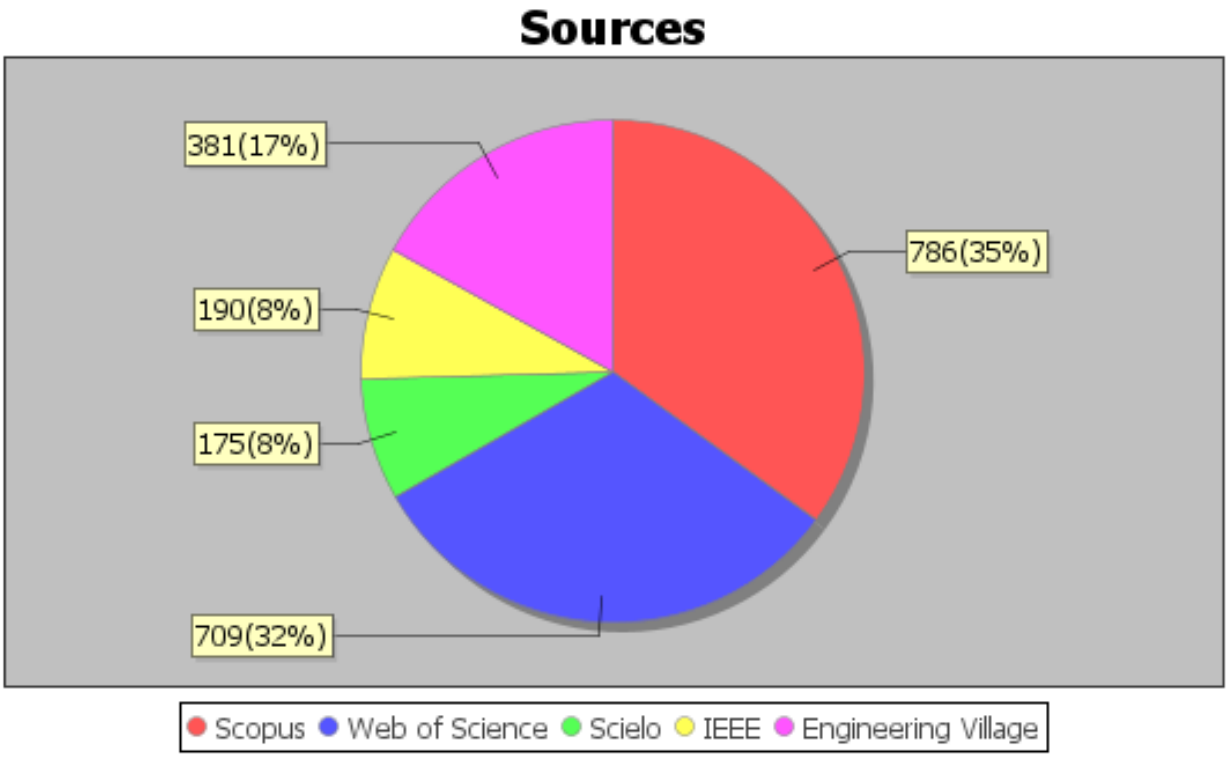


Figura 1: Pie chart representing the distribution of articles collected from five research sources: Scopus (35%), Web of Science (32%), IEEE (8%), Scielo (8%) e Engineering Village (17%). The chart shows the percentage of articles found in each of the search sources, totaling 100%, that is, 2241 articles.

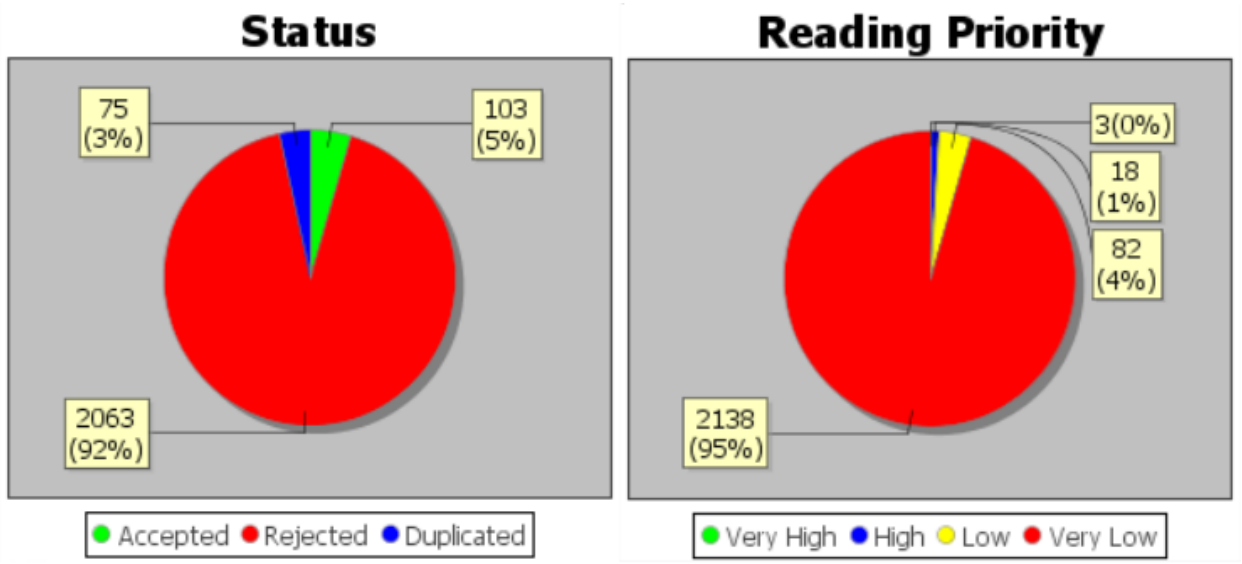


Figura 2: Pie chart showing the selected articles, the number of rejected, duplicated, and accepted articles. Thus, as the reading priority of each of them..

based on the PRISMA Checklist, to provide a better view of the steps followed until we achieve the final result.

With the selection of the 103 articles, at this stage, we read them in full and as we can see in Figure 4 represented in the form of a pie chart, we note that: 80 articles were rejected based on

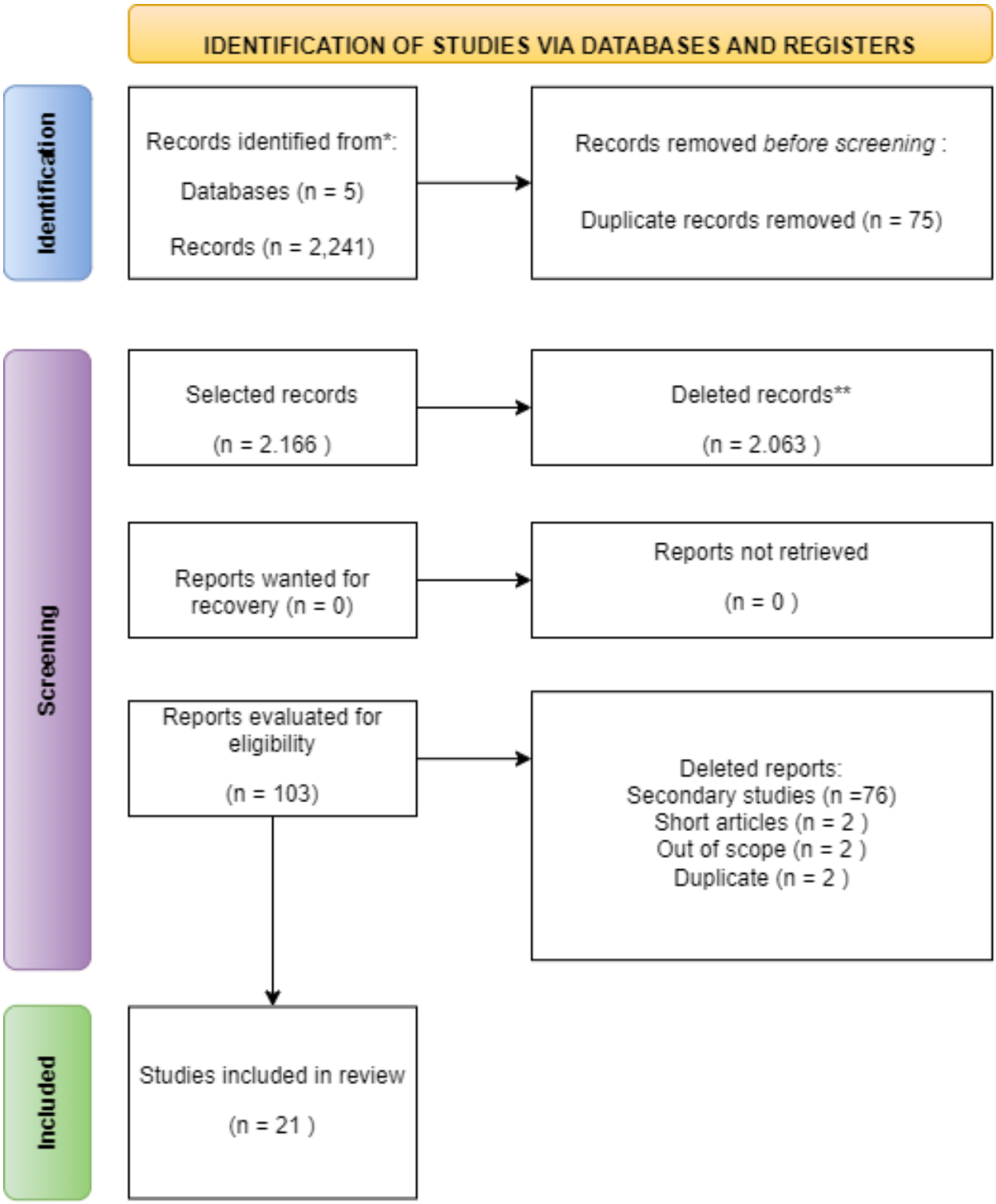


Figura 3: Chart based on the PRISMA Checklist, the same procedure that the Start tool uses to manage the SRL.

the exclusion criteria, 2 duplicated articles and 21 articles were accepted based on the inclusion criteria.

In this stage of work, which consists of extracting the most relevant works for the research,

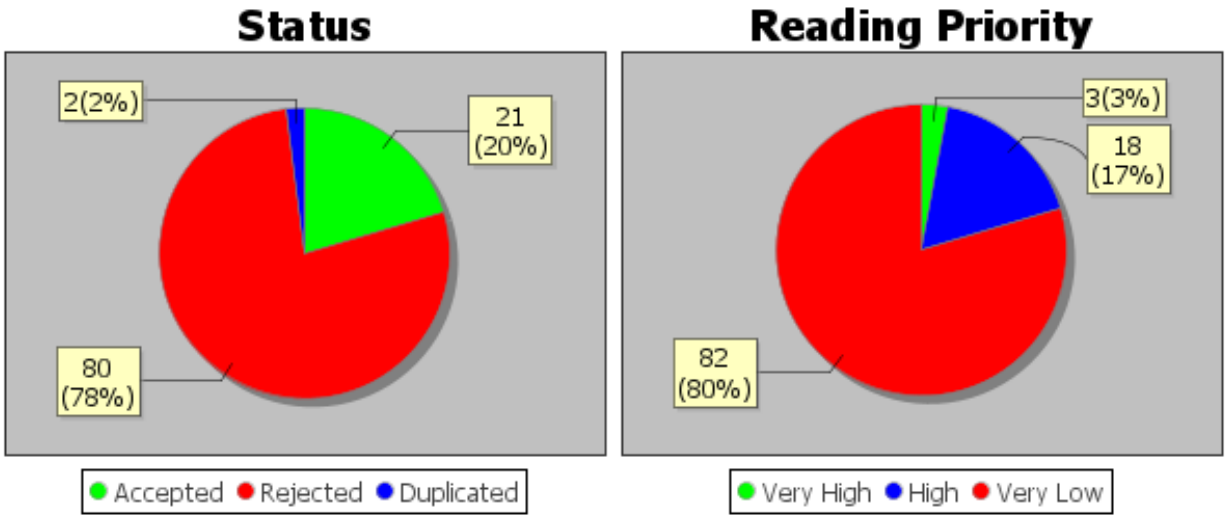


Figura 4: Pie chart representing the articles in the extraction phase, with 21 (20%) accepted, 80 (78%) rejected, and 2 (2%) duplicates. Thus, as the reading priority of each of them..

after reading, 3 (14%) articles continued with a very high priority order and 18 (82%) with a high priority. In this way, the fields of the data extraction form were filled out from the reading of each of the articles and saved on the StArt Tool platform.

The Figure 5 represents the set of characteristics that we identified in the protocol phase and their relationship with each article, demonstrating the characteristics in the form of a graph. Each item represented by a green square demonstrates the items selected in the extraction phase and the items in colored circles represent the characteristics observed in each of the items. In the protocol, 12 characteristics were defined to be analyzed, of these, seven characteristics were multiple choice and were represented by colored circles, with blue circles representing the population, green circles representing the type of research, gold circles representing evaluation, yellow circles representing the type of analysis, pink circles represent the type of publication, red circles represent the method and white circles represent the way the data was obtained however, 5 of these characteristics were open, namely the concept of Hybrid Learning, the description of the objectives, the country of publication, the context of the application, and technologies used in the article, therefore, they are not represented in this comparison chart.

Such as article ID 11, highlighted in Figure 5, has the following characteristics: the article observes high school students using Blended Learning, and it is a case study, in which a qualitative analysis was carried out. The evaluation of Blended Learning was positive and the results presented challenges in the implementation of students' autonomy. For all other articles, the same feature population analysis was approached to populate the database that was used here for data verification. These works are adequately summarized and explained in the following sections.

2.2.4 Data visualization

Data visualization through maps and word clouds can help in summarizing the systematic review since these tools allow quick identification of trends and patterns present in the studied literature. In this sense, of the 21 articles accepted, we can see in Figure 6 that they were held in different parts of the world. The colors represent the number of articles, according to the caption of Figure

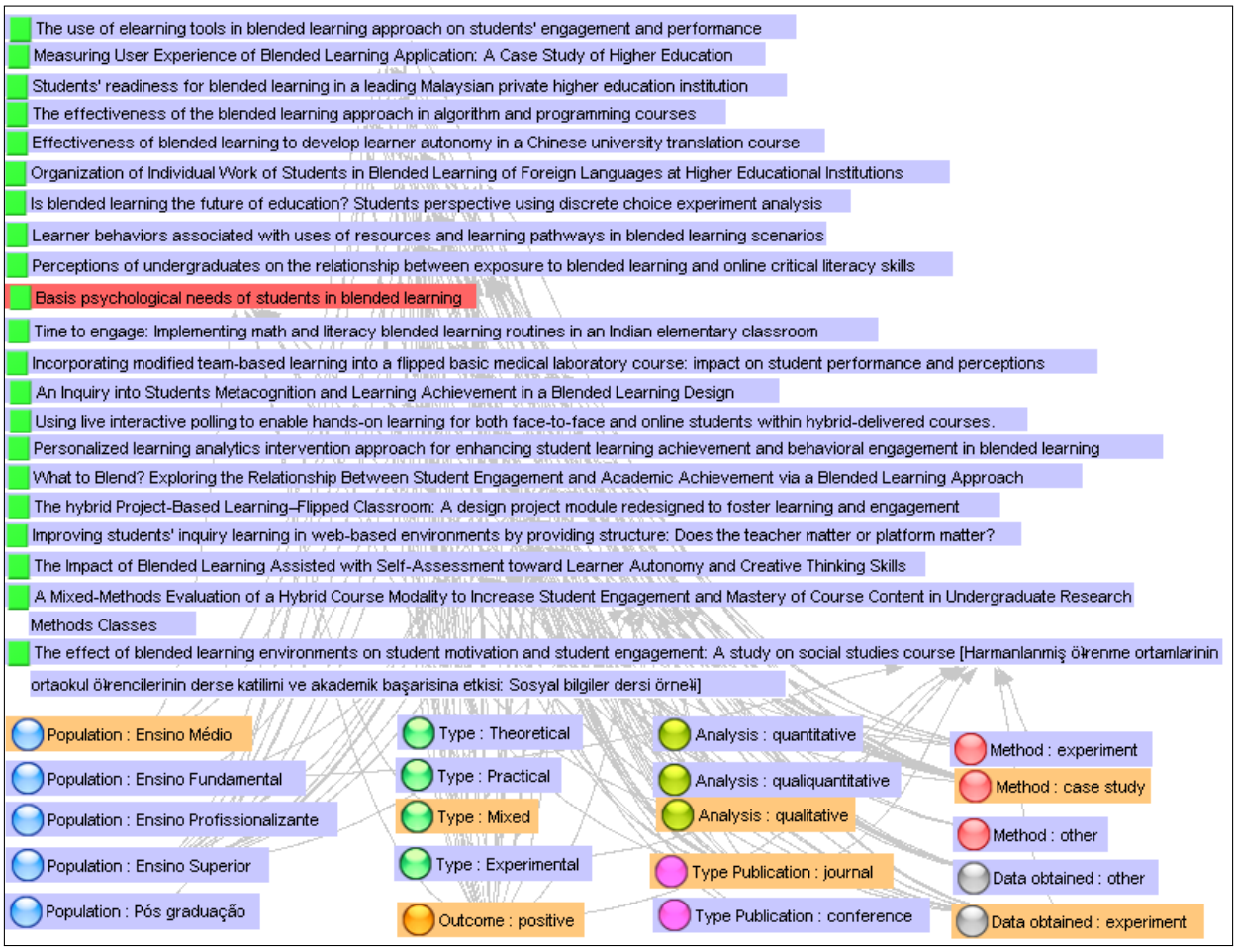


Figura 5: Graph representing the association between the article and the completed search form for each article accepted in the extraction phase..

6, with 1 article, represented by the color lilac, and a maximum of 4 articles, represented by the color purple.

China was the country where the most studies were carried out, with 4 articles published, within which they were chosen and accepted, while Brazil, for example, had only 1 study in an article published within the selected articles accepted in the extraction phase.

In Figure 7 we have five word clouds that summarize the list of accepted articles in the extraction phase. The word cloud is a useful tool in SRL as it can help you visualize the most frequent keywords in selected articles. From the word cloud, it is possible to identify the most recurrent themes in the literature, which can guide the analysis of articles and help identify gaps in the research. In addition, the word cloud can be used to identify synonyms and related terms that may have been used by the authors instead of the keywords defined in the initial search. In this way, the word cloud can help ensure that all relevant words are included when analyzing articles and answering research questions.

First, in Figure 7(a) we have a word cloud that synthesizes the main words found in the titles of the 21 extracted articles. In this sense, we can see that the word “Learning” appears in greater prominence and is therefore the most frequent among the accepted articles. Later, in Figure 7(b) we can see the word “Learning” is the most frequent, followed by the word “Students”. The

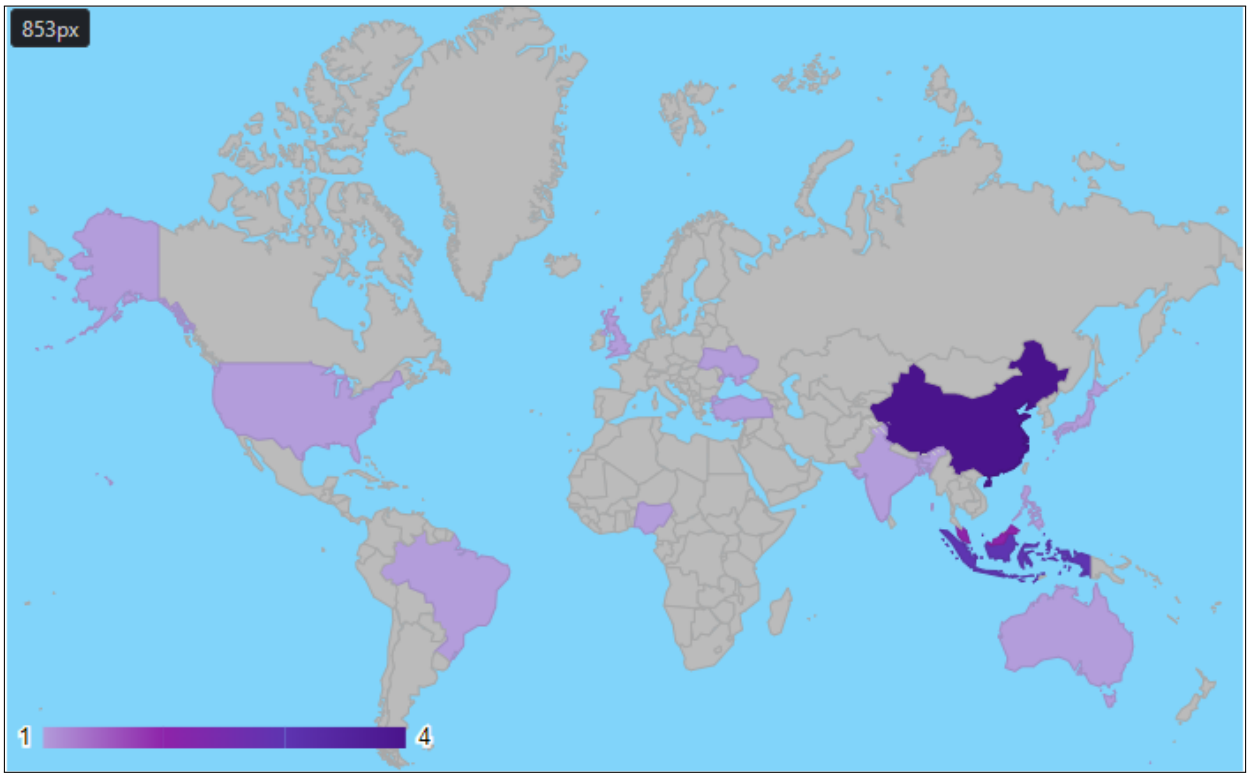
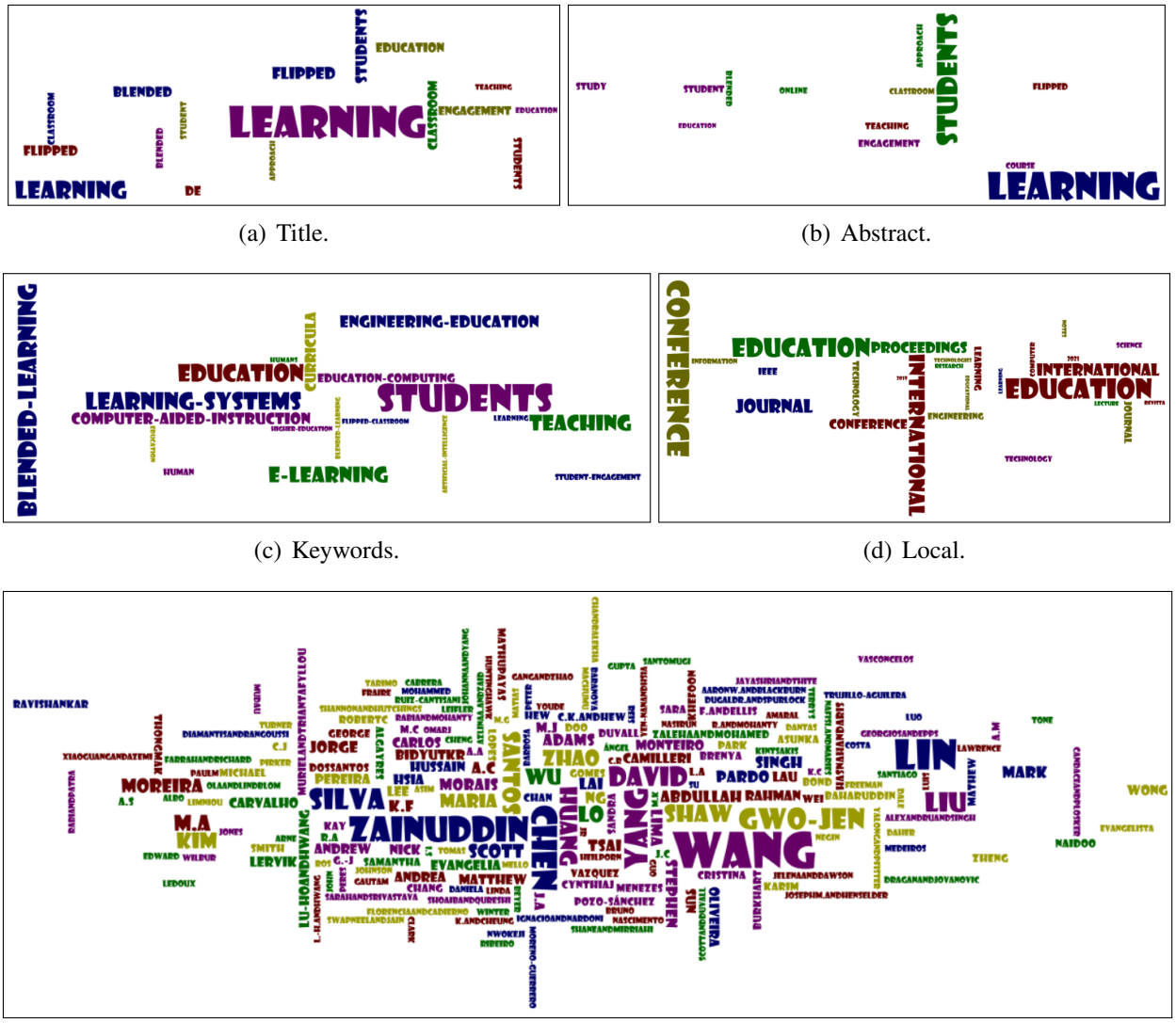


Figura 6: World map representing the number of works on blended learning investigated by country..

Figure 7(c) are the most frequent keywords, in this case, we can see that “Students, Blended-learning, Education, e-Learning and Learning-Systems”. Note that these words are the ones that most relate to the SRL that was performed here. Figure 7(d) presents the main congresses and journals in which the extracted articles were published. We can see that most of the accepted works were published in conferences, as it is the highlighted word in the word cloud. Finally, in Figure 7(e), in which it is possible to notice that few authors appeared in more than 1 article, and “Wang” is the most prominent author surname.

2.2.5 Review Finalization

Table 1 presents important data from each of the 21 articles and a summary of each article. Each column represents data from the articles: (a) Article ID, (b) Authors, (c) Year of publication, (d) Country where the study was conducted, (e) StArt score, (f) Reading priority and (g) Approach to the article. It is worth explaining that the method for calculating the StArt score is based on three criteria: title, summary, and keywords. In this sense, based on the search string, the application scores each article found as follows. For each word in the string found in the title, the article receives five points. For each word in the string found in the abstract, the article receives three points. And finally, for each word in the search string found in the keywords, the article receives two points. Thus, the application adds up all the points received for each article, which is the score. Another important point we highlight is how reading priority is defined. From reading the titles, abstracts, and keywords, the researcher analyzes the content read and classifies the articles



(a) Title. (b) Abstract.

(c) Keywords. (d) Local.

(e) Author.

Figura 7: Word cloud that summarizes the results by groups of articles accepted in the extraction phase.

as very low, low, high, or very high. Thus, he can prioritize the full reading of accepted articles that had a very high rating first and so on.

When analyzing the table, we can see that 50% of the articles were published in 2022, 30% of the articles were published in 2021, 10% of the articles were published in 2020, 5% of the articles were published in 2019 and 5% of the articles were published in 2015.

3 Results

In this section, the results obtained in the analysis of the works that compose this SLR are discussed. A more comprehensive discussion of the summary carried out in Table 1 will be performed for each of the 21 articles read.

Tabela 1: Theoretical framework that summarizes the 21 articles accepted in the SRL extraction phase.

ID	AUTHORS	YEAR	COUNTRY	SCORE OF START	READING PRIORITY	ARTICLE APPROACH	METHOD
1	de Brito Lima et al.	2022	Brazil	82	High	To analyze the behavior of high school students from a public school in the use of Blended Learning as a learning methodology. Investigate possible relationships between the choice of pathways and performance, student engagement, and levels of familiarity with ICT.	Mixed
2	Shen et al.	2022	China	88	High	Analyze the educational effects in a classroom combined with the team-based learning strategy	Mixed
3	Argyriou et al.	2022	England	67	High	To investigate whether student engagement with different online blended learning activities can improve academic performance.	Qualitative
4	Cui et al.	2022	China	97	Very High	To analyze the behavior of elementary school students in two experiments, the first group having a platform with a low support structure, the second group having a platform with a high support structure.	Mixed
5	Abdul Rahim et al.	2022	Malaysia	56	High	Evaluate the experience of students in the postgraduate blended teaching online module of the Research Methodology course.	Quantitative
6	Yang, C.C.Y. and Ogata, H.	2022	Japan	93	Very High	Personalized learning intervention through the methodology of Blended Learning.	Mixed
7	Phelps, C. and Moro, C.	2022	Australia	40	High	To investigate students' perceptions of interactive surveys and whether this hands-on learning method could provide equal experiences across multiple delivery modes within the syllabus.	Qualitative
8	Ahmed et al.	2022	Bangladesh	73	High	Analyze students' preference over traditional teaching and blended teaching.	Qualitative
9	Chen, J.	2022	China	112	High	Investigate students' learning responsibility, motivation to learn, involvement in learning and independence in learning.	Mixed
10	Sudirtha et al.	2022	Indonesia	60	High	Analyze the effects of learning combined with self-assessment on student autonomy and creative thinking ability.	Mixed
11	Wong, R.	2022	China	76	High	Discover how students perceived the basic psychological needs for relatedness, competence and autonomy in blended learning.	Qualitative
12	Avramenko et al.	2021	Ukraine	67	High	Evaluate the effectiveness of the individual work of students in blended education in order to identify problems and perspectives of autonomous learning.	Qualitative
13	Chua, K.J. and Islam, M.R.	2021	singapore	93	High	Enhance students' learning experiences in a curriculum connected to engineering design.	Mixed
14	Etom et al.	2021	Philippines	111	High	Determine impact on blended learning approach among high school students in school within science lab	Qualitative
15	Darmawan et al.	2021	Indonesia	94	High	Increase learning performance by applying the Blended Learning Approach	Mixed
16	Adams et al.	2021	Malaysia	117	High	To investigate student readiness for blended learning at a leading Malaysian private higher education institution.	Quantitative
17	Kundu et al.	2021	India	98	High	Investigate the effects of the mixed environment on student engagement in the classroom and study its potential in underprivileged classrooms.	Quantitative
18	Ahlin, E.M.	2020	USA	46	High	Expand the current knowledge base on student engagement in hybrid courses, assessing their perceptions of their engagement with the course.	Qualitative
19	Fola-Adebayo, T.J.	2019	Nigeria	39	High	To investigate the students' perception of the relationship between exposure to blended learning and the development of critical literacy skills.	Mixed
20	Saritepeci, M. and Çakir, H.	2015	Turkey	100	Very High	To analyze the effects of the blended learning environment on the engagement and academic performance of high school students.	Quantitative
21	Indriyanti, Nurma Yunita and Yamtinah, Sri	2020	Indonesia	73	High	To investigate the metacognition progression of blended teaching of undergraduate students and their performance in the environmental chemistry course	Quantitative

The study (de Brito Lima et al., 2022) was carried out in Brazil in 2022, with 92 low-income high school students from a public school in the Brazilian Northeast, students were divided into 4 groups, subdivided into 2 different scenarios. One uses the traditional method and the other uses the hybrid method. In the authors' view, blended learning combines face-to-face and online communication, incorporating different technological resources into the structure of classes. The

technology used in this study was not identified, the researchers used the Applet tool to engage students. The study showed greater engagement and performance on the part of students with the use of ICT in the classroom. This highlights the potential for blended learning practices to address the preferences and learning needs of different individuals and reinforces the importance of designing learning scenarios that encourage behavioral engagement.

According to (Shen et al., 2022) In a survey conducted in China in 2022 with 232 undergraduate students, students were divided into two groups, one using flipped classroom only and a second using flipped classroom combined with team-based learning. According to the authors, blended learning is an active method that improves time efficiency and encourages students to become independent and self-responsible learners. In this study, the technology used was not identified, the resources used were videos of pre-recorded lectures, slides, and reading tasks. The results of this research show that students who participated in the combined group reported that the applied method improved their ability to stimulate their interest in learning, promote the practical application of knowledge, and improve their scientific reasoning and problem-solving skills. According to the authors, this Blended Learning format improves time efficiency and encourages students to become independent and self-responsible.

The study (Argyriou et al., 2022) was carried out in England in 2022 with 123 undergraduate students, The study aimed to verify student engagement with different online blended learning activities. In the authors' view, blended learning is a combination of synchronous and asynchronous activities, which can occur via face-to-face and virtual learning platforms or in fully online formats. The technology used in this study was Moodle. The result according to the authors was positive since the intention was not to verify the performance but the conclusion of the activities. However, it was noted that all students who performed all the weekly activities performed better in the final exam.

In (Cui et al., 2022) a survey was carried out in China in 2022 with 74 elementary school students, to analyze the behavior of students in two experiments, the first group having a platform with a low support structure, the second group having a platform with high support and support structure. For the authors, blended learning combines learning environments, using platforms to optimize and enable greater student autonomy. The technology used in this study was the WISE application developed by the researchers. According to the authors, the group of students who received more support from teachers performed better than the group who had low support. In this sense, they concluded that the use of platforms alone is not enough to guarantee the most meaningful learning, it is necessary to support teachers with personalized feedback according to the needs of each student.

The work of (Abdul Rahim et al., 2022) was developed in Malaysia in 2022 with a group of 110 students from a postgraduate course, seeking to evaluate the student's experience in a Research Methodology module. In the authors' view, blended learning is blended learning, which most often focuses on synchronous and asynchronous moments, In this sense the learning method can take any form, such as video, web-based instruction, and much more. The technology used in this study was the application developed for this study called Blended Learning. According to the authors, Blended Learning has transformed education by giving autonomy to students.

According to (Yang e Ogata, 2022) An experiment was carried out in Japan in 2022 with 87 undergraduate students, divided into two groups. Being the experimental group composed of 45 students who learned with the proposed approach and received a personalized intervention. The control group consisted of 42 students from the other class who learned using the conventio-

nal Blended Learning approach. For the authors, Blended Learning is a methodology that allows combining face-to-face activities with various online digital resources. The technology used in this study was BookRool, which allows users to browse uploaded digital material at any time and place. The authors concluded that students who learned through the experimental group had better performance and involvement, significantly outperforming students who learned through conventional teaching.

The study (Phelps e Moro, 2022) was carried out in Australia in 2022, with a pilot study being carried out first with 37 students and later with 174 undergraduate students. The purpose of the research was to investigate students' perceptions of live interactive surveys and identify whether this hands-on learning method could provide equal experiences across multiple modes of delivery within the proposed content. In the authors' view, blended learning is an education that combines the traditional classroom with moments through the Web. The technology used in this study was the Blackboard Collaborate platform and the technological resource was Kahoot. According to the authors, through the feedback received from the students, they classified the learning method as pleasant, providing a fun experience.

In (Ahmed et al., 2022) study carried out in Bangladesh in the year 2022, with 306 university students, sought to analyze the students' preference over traditional teaching and blended teaching. For the authors, blended learning is the thoughtful synthesis of offline and online learning experiences that integrate technology and online learning materials with traditional classroom activities. The technology used in this study was not identified, the resources used were videos and online exams. According to the authors, the result showed that students value the opportunity to revisit classes, and it is important to include a synchronous time when educators and students can interact. Human interaction, whether online or offline, was considered crucial by students to conduct classes efficiently.

Second (Chen, 2022), the study was carried out in China in 2022, in a blended course with 120 undergraduate students, and sought to assess students' views on blended learning in the development of student autonomy. As well as investigating the construction of a mixed course by teachers and the influence of blended learning on students' learning responsibility, motivation to learn, involvement, and independence in learning. The authors define blended learning as involving a combination of online and face-to-face course components, with the concept that these elements work together as an integrated course. The technology used in this study was Zoom. According to the authors, the collected data indicate that students have positive attitudes toward blended learning, and most students agree that blended learning stimulates their interest in learning and activates their initiative to learn.

According to (Gede Sudirtha et al., 2022) in a study carried out in Indonesia in 2022, 70 students of Vocational Education, were divided into two groups, one control and the other experimental, which aimed to analyze the effects of learning combined with self-assessment on student autonomy and thinking ability creative. According to the authors, blended learning is a learning style that combines traditional classroom learning with online distance learning, allowing students to explore topics and share experiences in person and online. For this study, the technology used was Zoom. The authors concluded that blended learning based on self-assessment had a positive effect on the learning process, student autonomy, and ability to think creatively.

In (Wong, 2022) the study comprised a total of 150 students from 3 high schools in China in 2022 and sought to discover how students perceived the basic psychological needs of relationship, competence, and autonomy in blended learning. A pilot study was carried out with 36

students before the questionnaire was properly applied to the other study participants. According to the author, blended learning refers to the practice of using online and face-to-face learning experiences when teaching students. For example, students can participate in real classes taught by professors, while classes are integrated with online teaching and learning materials, and students complete their assignments online inside or outside the classroom. The technology used in this study was not identified. The study concluded that the study found that the relationship and competency of students' basic psychological needs were met in the current state of blended learning. The need for autonomy has not yet been met, according to the author, due to the school culture.

At work (Avramenko et al., 2021) study carried out with 260 higher education students in Ukraine in 2021, aimed to evaluate the effectiveness of students' work in blended teaching, to identify problems and perspectives of autonomous learning. According to the authors, blended learning aims at intellectual development and personal growth, combining the benefits of online learning with face-to-face meetings. The technologies used in this study were Teams and Zoom. It was found that students had ease of use, good integration, and interaction with the use of blended learning technologies. The authors point out that sociodemographic characteristics affect the efficiency of students' self-organization when studying.

Second (Chua e Islam, 2021) the study was carried out in Singapore in the year 2021, the same was done with a group of 60 university students who were divided into 6 working groups. The study sought to enhance students' learning experiences in a project-connected curriculum. For the authors, blended learning involves students in a more active learning process, in which it mixes face-to-face moments with online moments. The technology used in this study was an application developed by the researchers, the name of the application was not disclosed. The main conclusions of the study are that there was a significant increase in formative knowledge, improvement in problem-solving skills, and better performance.

In (Etom et al., 2021) study carried out in the Philippines in 2021, with 180 students in the last year of high school. It aimed to determine the impact of the blended learning approach among students in a science lab. For authors in blended learning, teachers become facilitators and planners of learning activities, while students tend to seek information and be proactive and effective in the teaching-learning process. The technology used in this study, the MOLE application, according to the researchers, is an application similar to Moodle. According to the authors, students prefer combined face-to-face and online classes because they like the flexibility of online class content at any time and therefore prefer more interactive and valuable classes.

The study (Darmawan et al., 2021) carried out in Indonesia in 2021, was carried out with 50 undergraduate students, to increase learning performance, applying the Blended Learning Approach. For the authors, blended learning combines online activities with traditional classroom methods, which can increase student engagement, resulting in better learning outcomes. The technology used in this study is the Moodle application. The authors concluded that blended learning offers an attractive learning environment for students and that students have different online learning experiences; some can keep up well with online learning while others still need to be motivated to be more active.

In (Adams et al., 2020) study carried out in Malaysia in 2021, data were collected from a sample of 274 undergraduate students, the study sought to investigate students' readiness for Blended Learning. According to the authors, BL is a combination of real-time face-to-face instruction using online digital resources. It offers students flexibility in terms of time and location, as well as access to educational resources. The technology used in this study was not defined, the

technological support resources were the Winsteps application. The overall results of this study revealed that students were ready for Blended Learning. However, further analysis indicated that students were only moderately ready for blended learning, according to the authors, learning activities and facilitation strategies need to be planned according to students' competence in learning technologies.

Second (Kundu et al., 2021) in a study carried out in India in 2021, with 40 elementary school students, sought to investigate the effects of the mixed environment on student engagement in the classroom and study its potential in underprivileged classrooms. For the authors, blended learning combines the integration of student-led online learning with a teacher-led offline component and leverages digital technology to give students greater control over the time, place, route, and/or pace of their learning. apprenticeship. The technology used in this study was not defined, the researchers only reported that during the study, due to the low infrastructure of the school, they made the computers available to the school to carry out this research. In the authors' view, BL had a positive effect on student engagement in the blended classroom. As children made choices and teachers determined which activities were engaging and which were not, the number of actively engaged children increased.

In (Ahlin, 2020) study carried out in the United States of America in 2021. The sample was carried out with 96 students in the traditional method and 84 students in the hybrid method. This study compares traditional and hybrid course modalities. The traditional course used face-to-face lectures and classroom participation activities to demonstrate new concepts. In this modality, all course content delivery and material applications were taught in the classroom without the benefit of technology. The content of the hybrid course was divided into face-to-face and online modalities. Students gather on campus once a week for a 75-minute lecture and class discussion for the first thirteen weeks of the semester. According to the authors, blended learning offers flexible course delivery options that combine the benefits of classroom instruction with advances in online technology. The technology used in this study was Canvas For Education. Students had the flexibility to engage with the online portion of the class anytime after the face-to-face class, but always before the next face-to-face meeting. The researchers evaluated the student's performance in the hybrid method as positive. The authors evaluated the student's performance in the hybrid method as positive about the conventional method. In addition to demonstrating the potential of a hybrid modality to increase student interest in a course often considered disinfectant for undergraduate students.

In the study (Fola-Adebayo, 2019) carried out in Nigeria in 2019, with 64 undergraduate students, aimed to investigate the students' perception of the relationship between exposure to Blended Learning and the development of critical literacy skills. For the authors, the hybrid approach with synchronous and asynchronous moments encourages students to learn interactively, collaboratively, and at their own pace and time. In this study, the technology used was Moodle. According to the authors, the results of this study, indicating a relationship between exposure to blended learning and the development of critical online literacy skills, are supported by researchers' observation that blended learning leads to deep and meaningful educational experiences, promotes student engagement, and improves learning outcomes.

In the search (Sarıtepeci e Çakır, 2015) carried out in Turkey in 2015, with 107 elementary school students, 55 from the control group and 52 from the experimental group. It sought to analyze the effects of the blended learning environment on the engagement and academic performance of elementary school students. For the authors, blended learning combines beneficial

aspects of face-to-face learning with online learning in a balanced way to obtain the maximum benefit from both face-to-face and online learning environments. In this study the researchers used Moodle. According to the results of this study, in a blended learning environment, there was a significant increase in average academic performance when compared to students in a face-to-face learning environment.

Finally in the study (Indriyanti et al., 2020) held in Indonesia in 2020, with 59 undergraduate students. 29 students were randomly selected to form the experimental class, while the remaining 30 formed the control group. This study aimed to investigate the progression of blended learning metacognition of undergraduate students. In the authors' view, BL combines classroom activities with computer-based learning, both online and offline. The advantages of mixed design are flexibility in terms of time and space; encouragement for students to become more autonomous and responsible for their learning and be ability to choose the most effective strategies based on their characteristics. The technology used in this study was Moodle. The authors concluded that the implementation of BL resulted in a positive impact on students' metacognition since students in the experimental class scored higher on metacognition indicators.

4 Discussion

The studies cited provide compelling evidence that BL is a highly effective approach to improving student engagement and performance. As well as we can contrast with other literature works on this theme. However, as other authors in the literature (Roseth et al., 2013; Serrano et al., 2019), the teacher must maintain direct and frequent contact, even in this teaching format. In addition, some authors even suggest the use of creating small workgroups between students in online and face-to-face mode for each class (Roseth et al., 2013). Constant communication with students (face-to-face) is an important component of blended learning (Lima e Isotani, 2022), because it allows the teacher to build stronger relationships with students, provide individualized support, assess students' level of understanding make adjustments to instruction, and help create a sense of community and belonging in the classroom. This sense of community refers to the feeling that students feel part of a cohesive and integrated group within the school environment Dörnyei e Muir, 2019. It is the perception that they are part of a learning community that values active participation and collaboration and that shares common goals.

There are already many works in the literature that also make a parallel between active learning and students' sense of belonging when working in groups (Dörnyei e Muir, 2019; Struyf et al., 2019; Uz Bilgin e Gul, 2020), as well as in the works accepted in the extraction phase of the SLR (Chua e Islam, 2021; de Brito Lima et al., 2022; Gede Sudirtha et al., 2022; Shen et al., 2022; Yang e Ogata, 2022), who also cite the importance of this work methodology. When students feel a sense of community and belonging in the classroom, they tend to feel more motivated and engaged in the learning process. They feel comfortable participating in activities and discussing ideas with their peers and teachers, which can lead to a better understanding of concepts and further development of social and emotional skills (Dörnyei e Muir, 2019). In addition, a sense of community can also help promote inclusion and reduce bullying and other forms of negative behavior at school (Benítez-Sillero et al., 2021).

The SRL results also revealed that the combination of face-to-face and online learning (Etom et al., 2021) can significantly improve students' ability to develop an interest in learning, promote

the practical application of knowledge (Shen et al., 2022), strengthen scientific reasoning and problem-solving skills (Syafril et al., 2021), and increase students' autonomy and independence (Abdul Rahim et al., 2022).

One of the studies demonstrated that the inclusion of Information and Communication Technology (ICT) in the classroom can increase student engagement and performance (Sarıtepeci e Çakır, 2015). Another study emphasized the importance of designing learning scenarios that encourage student behavioral engagement (de Brito Lima et al., 2022). In addition, the results of one of the surveys revealed that all students who completed the weekly activities performed better on the final exam (Argyriou et al., 2022). Parallel to other studies in the literature, ICTs allow students to access learning content more flexibly and conveniently, accessing them anytime and from anywhere Agustina e Purnawarman, 2020 and receiving immediate feedback. In addition, ICTs allow teaching to be more interactive, with the use of resources such as videos and video conferences, discussion forums, educational games, chat rooms, simulations, and other online activities that can increase students' motivation and interest.

Another essential aspect highlighted by the studies is the students' preference for Blended Learning (Phelps e Moro, 2022). Students value the opportunity to revisit classes and human interaction with educators and peers, both online and offline (Ahmed et al., 2022, Sendacz et al., 2023 Therefore, the BL approach must be carefully designed to meet students' preferences and learning needs. (Cui et al., 2022; Yang e Ogata, 2022), providing adequate support and interaction. Another important point is that ICTs can make the learning process more participatory and social. (Ahmed et al., 2022). BL aligned with ICTs can make students increase their performance Ahlin, 2020; Darmawan et al., 2021and can adjust their learning strategies to improve their engagement and performance in the course, with the collaboration of professors.

In summary, from reading the articles accepted in the extraction phase, it was possible to perceive the importance of including ICT in the classroom as a support for blended learning, which is capable of designing learning scenarios that stimulate behavioral engagement, provide support and interaction with students and encourage completion of weekly activities. By following these guidelines, educators, within the context of blended learning, can help their students reach their full potential.

5 Lessons Learned

This section will present the lessons learned from the SLR on blended learning in promoting student engagement and autonomy. First, we will present the answers to the research questions, which will allow us to identify the main strategies used to increase students' engagement and autonomy in BL. Next, we will present a guide of recommendations for teachers who wish to apply these strategies in their pedagogical practices. Finally, we will present the limitations of this research, which will help us to identify possible paths for future investigations on the subject.

5.1 Answers to Research Questions

After reading it, we could see that the feedback was very positive for the use of Blended Learning in the classroom. Occasionally we could see that some articles were conflicting because although the authors evaluated the use of Blended Learning positively, they had reservations such as (Wong,

2022) concluded that the student's need for autonomy was not met and in (Darmawan et al., 2021) shows that some students need to be motivated to be more active. Another interesting point is that only two of the twenty-one articles selected in this SRL addressed, even in a subtle way, the difference between gender in the hybrid modality, (Lima et al., 2017) found no significant difference in the performance of participants of different genders and (Avramenko et al., 2021) the study demonstrates that men have greater difficulty in self-organizing autonomy than women. Thus, we see a gap to be explored in future work. Based on the data found, we will try to answer each of the questions presented in Subsection 2.1.1 of the Protocol.

QP1 As we saw in the articles presented, the use of Blended Learning has shown satisfactory results in general terms in terms of student engagement, especially with the use of activities that encourage participation, and meet the preferences and needs of students. As we can see in the work of (de Brito Lima et al., 2022) key findings show strong associations between engaged behavior and better academic performance. In (Yang e Ogata, 2022) students who learned through personalized interventions showed greater engagement in learning than those learning without personalized intervention support. Already (Chua e Islam, 2021) revealed in the research carried out that blended learning promoted greater engagement in most of the students who excelled in promoting their critical thinking, improved and sharpened their problem-solving skills, deepened their interaction with various individuals, and had highly active group participation.

QP2 In general, blended learning has contributed to more autonomous learning of students. In Chen, 2022 most students agree that blended learning stimulates their interest in learning and activates their initiative to learn. However, it is not a reality in all schools, since access to ICT can vary according to nationality and socioeconomic aspects. Second Wong, 2022 students' autonomy has not been met, for the time being, due to school culture, assessments, and the conventional roles of teachers and students.

QP3 The main evidence of more meaningful learning, was the improvement in the students' interest in learning, a better performance in the evaluations, a better involvement, and a better ability in solving problems. Some students classified it as pleasant and fun learning. In Shen et al., 2022 the study demonstrated that the blended learning model improved students' academic performance, including both immediate and long-term learning outcomes. Already in Yang e Ogata, 2022 students who learned with the proposed approach significantly outperformed students who learned with the traditional approach.

QP4 While reading the research we could see the importance of using ICT such as Moodle, Zoom, and Canvas to mediate the learning processes, as we can see in Figure 8. Some instruments for data collection and technological tools were also used to help during classes such as Google Forms, Book Rool, Winsteps, and Applet. The use of technology was well accepted by the students and proved to be efficient in more meaningful learning. For Abdul Rahim et al., 2022 results showed that students generally find applications used in blended learning engaging and challenging, easy to understand, and under their control. In Fola-Adebayo, 2019 results revealed that students claimed to have benefited from improvement in ICT skills, acquisition of additional knowledge after class, and control over learning time. Second Etom et al., 2021 students are efficient in the use of ICT, but family income can negatively interfere with access to ICT by all students.

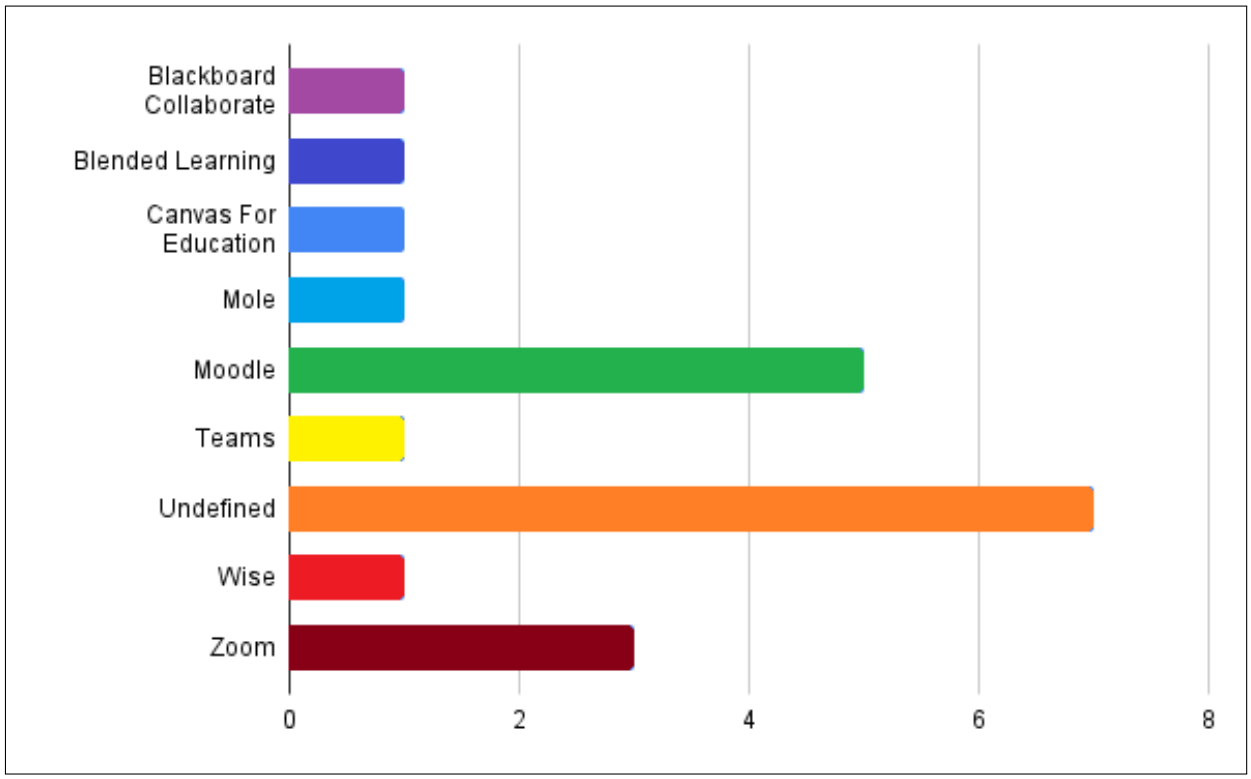


Figura 8: Bar graph representing the technologies used by researchers in the application of Blended Learning.

5.2 Recommendations for Teachers

From the reading of each of the articles and after answering the research questions, we prepared a guide of recommendations for teachers who wish to insert blended learning as a teaching methodology. Figure 9 presents a mind map with a guide to some recommendations that may be useful for teachers who want to increase student engagement and autonomy in Blended Learning. A mind map is a visual tool that can be useful in organizing the information and ideas collected in the literature review. Thus, this map can guide, structure, and connect the relevant information more clearly and concisely, making it easier for teachers to understand and memorize the recommendations. It is important to remember that each class and context has its particularities and, therefore, the teacher must adapt these recommendations according to the needs of the students.

1. Planning: It is important to carry out prior planning for Blended Learning, considering the use of technologies and materials that will be used in both the virtual and face-to-face environments.

2. Communication: Maintain clear and constant communication with students, informing them about activities and guidelines for the learning process.

3. Innovation: Always looking for new ways to engage and encourage students, through technological innovations and pedagogical methodologies.

4. Interaction: Encourage interaction between students and between students and professors,

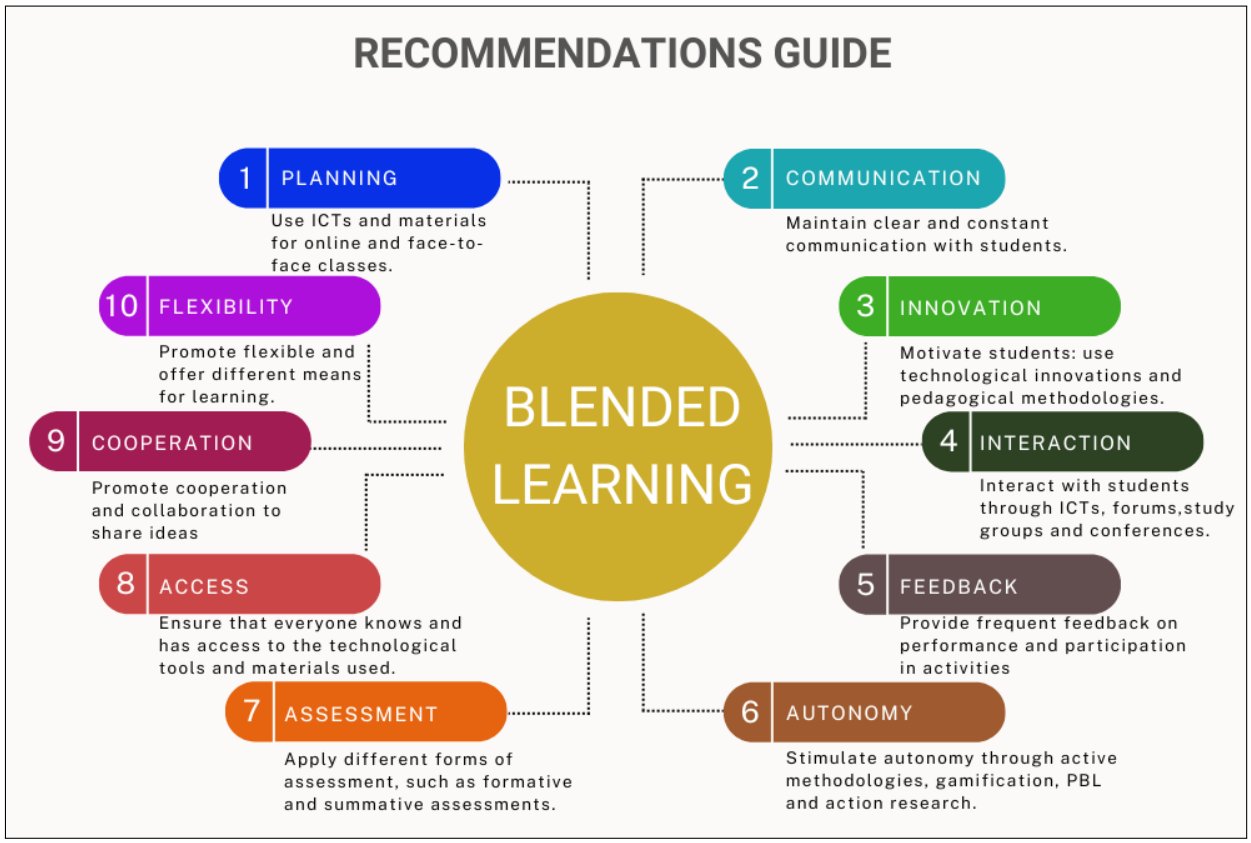


Figura 9: Guide with recommendations to help teachers who want to increase student engagement and autonomy in Blended Learning..

either through discussion forums, study groups, or videoconferences, among other possibilities.

5. Feedback: Provide frequent and constructive feedback to students, both on performance and participation in activities, encouraging the learning process.

6. Autonomy: Stimulate students' autonomy by creating activities that involve research, analysis, and problem-solving, enabling students to be responsible for their learning.

7. Assessment: Use different forms of assessment, such as formative and summative assessments, to check student performance and learning.

8. Access: Ensure that all students have access to the technological tools and materials used in Blended Learning.

9. Cooperation: Promote cooperation and collaboration among students, whether in the virtual or face-to-face environment, so that they can share knowledge and experiences.

10. Flexibility: Be flexible in adapting to the different needs of students, offering different learning alternatives and enabling the active participation of students in choosing activities.

5.3 Limitations

At the end of the SRL, we could see that the total number of studies analyzed was relatively low compared to the number of studies available in the literature, which may limit the scope and representativeness of the results obtained. From the 21 articles extracted, we could see a greater trend of research carried out in Higher Education. In a classification by their target audience, it was possible to notice that there are 12 jobs for Higher Education (57%), 3 jobs for High School (14%), 3 jobs for Elementary Education (14%), 1 job for Vocational Education (6%) and 2 postgraduate works (9%). as represented in the pie chart in Figure 10. In this sense, the scarcity of work carried

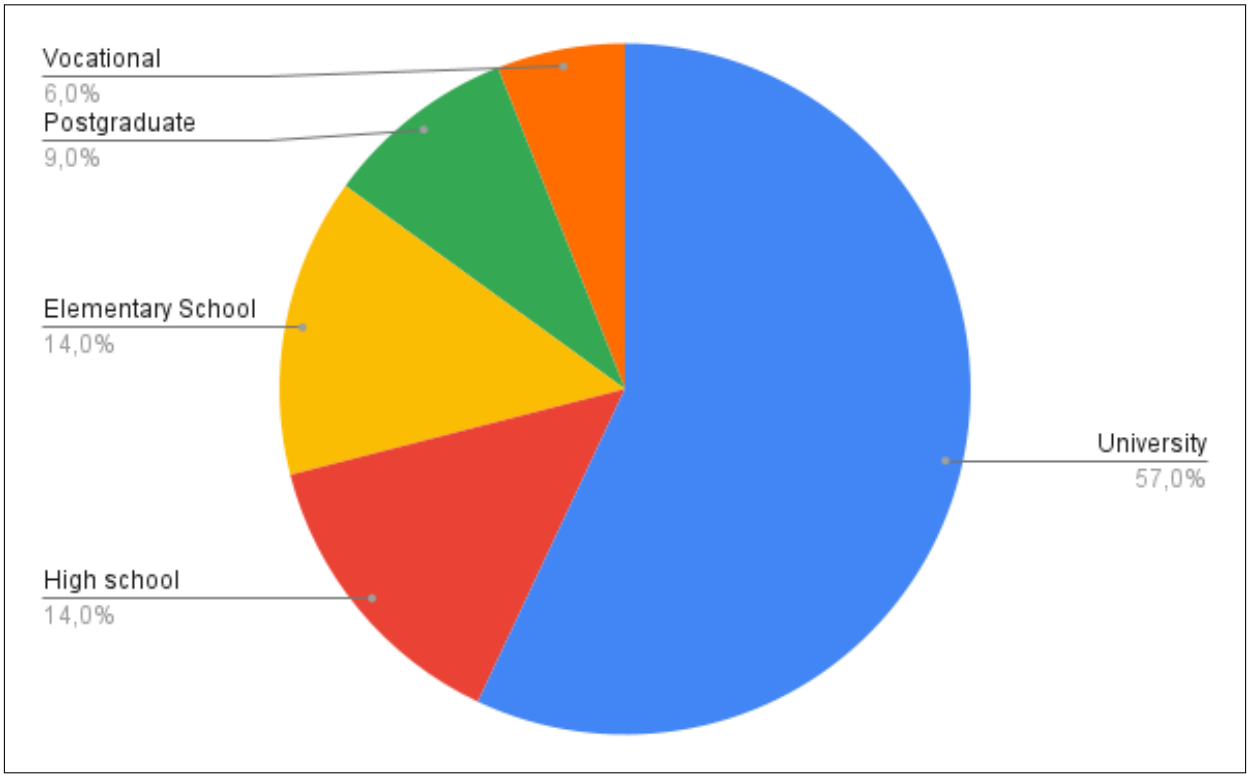


Figura 10: Graph that demonstrates target audience by educational level.

out in Elementary, High, and Vocational Education becomes a limiting factor for us to respond effectively to the questions of this RSL. Since we end up limiting ourselves to the experience of the university public, which already has an educational background and a differentiated age group, as well as academic maturity.

Additionally, the SRL may not have included relevant studies in other regions of the world that were not considered in the research, limiting the overall understanding of blended learning and its impact on student engagement and autonomy. Since, the focused on studies carried out in only 15 countries, which may limit the generalization of the results to other regions of the world, especially those that were excluded from the research.

The predominance of studies in Asian countries may limit the generalization of results to other geographic regions, considering that pedagogical and cultural practices can vary widely between different educational contexts. For example, the lack of representativeness of countries in South America, including Brazil (which represents 1 single study), may limit understanding of

the impact of blended learning in the region, since each country may have its own cultural and educational characteristics.

The lack of an in-depth analysis of the cultural and pedagogical differences between the countries studied may limit the understanding of the specific conditions under which blended learning can be more or less effective in promoting student engagement and autonomy, considering the digital resources in the classrooms. schools, digital resources available to students, and even the infrastructure supported by the country can significantly change the blended learning experience.

6 Conclusions

Blended Learning is a teaching modality that has enabled student autonomy in recent decades. In this sense, it gives students the freedom to learn by allowing them to access materials online when needed, thus enabling them to control their study time while also enabling learning through face-to-face interactions.

In this work, we seek to understand the contribution of BL to learning with greater engagement and autonomy of students, as well as to verify its effectiveness in producing more meaningful learning. The analysis was carried out by an RSL, in five databases, in which 2241 articles were found, 75 of which were duplicates, but with different titles, from different parts of the world, proving that Blended Learning has been studied by several researchers. Of these, 103 passed through the selection criteria and only 21 through extraction. After extraction, a grouping of articles with greater similarity for writing the outcomes of responses to research questions was carried out.

Finally, the research questions could be answered and it was found that blended learning has several advantages over its use, such as the possibility of interactive communication between teacher and student, flexibility in the execution time of activities, greater autonomy of students, usability for different levels of education. Among the limitations found are the socioeconomic issues that may make it impossible for all students to have access to ICT in their homes. From these responses, we created a map with a guide with ten recommendations to support teachers, ranging from recommendations for planning and level of access to those that involve forms of communication and interaction between student-student and teacher-student. This guide makes the information more easily accessible and understandable for teachers, allowing them to quickly identify areas that need improvement and strategies that can be applied in their teaching practice. The map can be updated and refined as new information is collected over time, allowing for constant revision and continuous improvement of the teacher recommendations guide.

In this work, we noticed some reservations by the authors about the need for teachers to propose activities that encourage students' autonomy, as well as socioeconomic issues that may interfere with the effectiveness of using Blended Learning in the educational environment. And even the need for a change in school culture so that students are more autonomous in their studies. Another point is that more research is needed to standardize the definition of blended learning and determine its effectiveness in different educational contexts.

For future work, we intend to investigate which applications demonstrate greater efficiency in the use of BL in the school environment, as well as their contributions to engagement and more meaningful learning. In addition, we intend to investigate the effectiveness of blended learning in different subjects, to better understand how this approach can be adapted to different areas of kno-

wledge. Conduct longitudinal studies to assess the long-term impact of blended learning on both student academic performance and life skills development. Investigate the role of technological resources in BL, assessing the impact of technology on student learning. Furthermore, we found some gaps to be clarified in future work, such as the negative points of working with BL. Thus, gender can impact student engagement and autonomy.

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