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ARTIGO

ACTIVE METHODOLOGIES: IN SEARCH OF A CHARACTERIZATION AND DEFINITION[1]

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ABSTRACT: Active Methodologies (AMs) are a set of pedagogical alternatives aimed at facilitating student learning and/or providing a critical and problematizing education of reality by shifting the student to the center of the knowledge construction process. We conducted a bibliographic research on scientific articles about the topic "Active Methodologies," selected from the CAPES periodicals portal. The purpose of this study is to present a general characterization of the AMs identified in the literature, considering an analysis of the definitions of AMs used by the authors, the identification of the main theoretical and epistemological frameworks employed to support these methodologies, and an analysis of the different methodologies considered in the literature as AMs. In this context, we came to a definition of active methodologies, which is part of this article. Our results indicate that there has been

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an increase in research on AMs in recent years, with a prevalence of research in the Health area, and that some articles are based on the ideas of established theorists such as Freire, Dewey, Piaget, and Ausubel. We identified a diversity of different active methodologies among the 24 methodologies considered active by the authors present in our sample. In general, active methodologies share the common characteristics of student protagonism and education from a critical perspective.

Keywords: bibliographic research, definition of active methodology, active learning.

METODOLOGIAS ATIVAS: EM BUSCA DE UMA CARACTERIZAÇÃO E DEFINIÇÃO

RESUMO: As Metodologias Ativas (MAs) são um conjunto de alternativas pedagógicas que visam facilitar a aprendizagem dos estudantes e/ou proporcionar uma educação crítica e problematizadora da realidade a partir do redirecionamento do estudante para o centro do processo de construção do conhecimento. Realizamos uma pesquisa bibliográfica em artigos científicos sobre o tema "Metodologias Ativas", selecionados no Portal de periódicos da CAPES. O intuito deste estudo é apresentar uma caracterização geral das MAs identificadas na literatura, considerando uma análise sobre as definições de MAs utilizadas pelos autores, a identificação dos principais referenciais teóricos e epistemológicos empregados para fundamentar essas metodologias, e uma análise das diferentes metodologias consideradas na literatura como MAs. Nesse contexto, chegamos a uma definição de metodologias ativas, que faz parte deste artigo. Nossos resultados apontam que houve um crescimento nas pesquisas sobre MAs nos últimos anos, prevalecendo pesquisas na área da Saúde, e que alguns artigos estão fundamentados nas ideias de teóricos consolidados como Freire, Dewey, Piaget e Ausubel. Identificamos uma diversidade de metodologias ativas diferentes dentre as 24 metodologias consideradas como ativas pelos autores presentes na nossa amostra. De modo geral, as metodologias ativas apresentam como características em comum a ideia/definição de protagonismo do estudante e a educação numa perspectiva crítica.

Palavras-chave: pesquisa bibliográfica, definição de metodologia ativa, aprendizagem ativa.

METODOLOGÍAS ACTIVAS: EN BUSCA DE UNA CARACTERIZACIÓN Y DEFINICIÓN

RESUMEN: Las Metodologías Activas (MA) son un conjunto de alternativas pedagógicas que pretenden facilitar el aprendizaje del alumno y/o proporcionar una educación crítica y problematizadora de la realidad a partir de la reconducción del alumno al centro del proceso de construcción del conocimiento. A partir de eso, hemos realizado una investigación bibliográfica en artículos científicos sobre el tema "Metodologías Activas", que fueron seleccionados del portal de publicaciones de la Coordinación de Perfeccionamiento de Personal de Nivel Superior (CAPES). El objetivo de este estudio es presentar una caracterización general de las MA identificadas en la literatura, considerando un análisis de las definiciones de las MA utilizadas por los autores, la identificación de las principales referencias teóricas y epistemológicas utilizadas para fundamentar estas metodologías y un análisis de las diferentes metodologías consideradas en la literatura como MA. En este contexto, hemos llegado a una definición de metodologías activas, la cual aparece en este artículo. Nuestros resultados indican que en los últimos años la investigación sobre las MA ha aumentado, prevaleciendo la investigación en el área de la Salud y que algunos de los artículos seleccionados consideran teóricos consolidados para apoyar su trabajo, como: Freire, Dewey, Piaget y Ausubel. Identificamos una diversidad de metodologías activas diferentes entre un total de 24 metodologías consideradas como activas por los autores presentes en nuestra muestra. En general, las metodologías activas presentan como característica común la idea/definición del protagonismo del alumno y la educación desde una perspectiva crítica.

Palabras clave: investigación bibliográfica, definición de metodología activa, aprendizaje activo.

INTRODUCTION

Each generation is defined by its own characteristics related to its social and historical context, considering behaviors, lifestyles, values, technological influence, among others. The 21st century began with new reflections on the teaching and learning process, with special attention to the new generations that are connected, the so-called "Alpha Generation," which includes those born from 2010 onwards.

Generally speaking, those born in this generation can be considered digital natives, as they have been (since birth) in a context where digital resources such as smartphones[2], tablets[3], computers, apps[4], and the internet are part of their daily use. This is due to the fact that access to technology has been facilitated, and more people are connecting, whether for work, study, or leisure.

In this globalized world, which has been modified to some extent by the insertion of technologies in different contexts, including schools, new ways of teaching and learning have emerged that need to undergo a process of revision, since the mere insertion of technologies in classrooms does not solve all the problems of education. Technology is only one element in a vast network of relationships that influence the ways humans teach and learn. In this context, we can observe that studies in cognition have much to contribute to investigations into culture, mind, and brain. However, uncertainties remain about some conceptions of pedagogical practices still present in educational settings.

In the quest to overcome methodologies and practices that do not meet the needs of this new generation, there is a movement among researchers in the field of Education/Teaching in support of the use of Active Methodologies (AMs) for teaching and learning, which aim to promote a transformative and up-to-date education (Bacich & Moran, 2018; Soares, 2021). In general, we can say that AMs bring with them a problematizing focus as a didactic strategy aimed at integrating theoretical and practical knowledge from a critical and reflective perspective. In this condition, practices should be student-centered rather than teacher-centered, with the latter acting as a mediator of the teaching and learning process. However, such practices and theoretical perspectives are not new in the field of education and teaching.

Soares (2021) presents a summary of early 20th-century student-centered theories proposed by researchers such as Dewey, Steiner, Freinet, Montessori, and Malaguzzi, which lead us to reflect on the discussion currently imposed on Education. This reflection should be critical, considering that in the early 20th century we did not have digital natives and people continuously connected to networks, although these theories already indicated that the focus should be on the student. It must be considered that the problem of teaching is not only related to the insertion of technologies in schools but to cognition, that is, the processes by which humans learn. Furthermore, studies by Vygotsky, Wallon, and Gardner complement these theories, bringing the reflection of a participatory and social teaching-learning process, anchored in the construction of knowledge. Other theories allow us to reflect on meaningful learning, such as Ausubel's, or bring us the idea that learning occurs through stages of human cognitive

[2] A mobile phone of the smartphone type, has functions similar to those of a computer, allowing access to web pages, editing photos, videos, and documents, playing games, watching videos, and communicating.
[3] A mobile device with a touchscreen that has functions similar to those of a computer, enabling the user to access web pages, watch videos, and edit photos and videos.
[4] These are software applications present in smartphones and other devices such as smart TVs, allowing users to play games, watch videos, send instant messages, and edit photos and videos.

development and that knowledge is constructed by the learner, as defended by Piaget (considered a constructivist).

Regarding theories, we find some questions relevant: Why have these theories not become effective practice in the classroom? What other theories have occupied this place? Why did this happen? A possible answer (or hypothesis) may be centered on the fact that there was a generation adapted to the reception of knowledge with little criticism of their social and historical context. Although such questions deserve a more in-depth study, they are not part of the scope of this research work.

Considering the outlined scenario, briefly, we can say that there is a need for transformation in education, especially in its practices. And while we recognize the transformative nature of education, we find that what happens inside classrooms has a long-lasting effect and does not change easily. Thus, in our current time-space, we are still discussing possibilities, an idea of an active, critical, participatory student who is the protagonist of their own learning.

Discussions about active learning are not new. Since the end of the 19th century, theorists such as William James, John Dewey, Adolphe Ferrière, and Edouard Claparède have argued for the need for active learning (Araujo, 2015). However, Cortiano and Menezes (2020) explain that the innovative character of active methodologies is configured insofar as they contrast with traditional teaching.

In this context, and considering that much of what is old and known is considered new, this research originated with the research problem: "How does the literature present Active Methodologies (AMs)?" To address this research problem, we defined the following objectives: To identify in academic production how authors define active methodologies in order to build a unified definition on the subject; To map the production in terms of the number of studies, the areas they are situated in, the level of education, and the geographical location where the research was conducted; To characterize active methodologies from already published works; To list the theoretical references used by researchers concerning active methodologies; To point out the active methodologies used in the research and their definition. In this article, we also seek to problematize Active Methodologies and bring a critical reflection on this subject.

Based on the research problem, we conducted a bibliographic research on Active Methodologies in scientific articles available on the CAPES (Coordination for the Improvement of Higher Education Personnel) periodicals portal to achieve our objectives and arrive at a characterization and definition of active methodology.

ANALYSIS METHODOLOGY

This study is a basic qualitative research of an exploratory and bibliographic nature (Gehardt & Silveira, 2009). It is characterized as bibliographic research that seeks to solve the research problem through texts that have already been peer-reviewed and published. According to Lakatos and Marconi (2003, p. 183): "[...] bibliographic research is not a mere repetition of what has already been said or written about a certain subject, but it allows the examination of a topic from a new perspective or approach, reaching innovative conclusions." This type of research results in the formulation of theoretical constructs important for understanding a particular subject, how and under what perspectives the topic was treated and presented to the scientific community. It is within this context that the research presented here was developed, understanding that the use of the term "Active Methodology" demands an appropriate and unified definition.

The research was conducted on the CAPES journal portal. This portal offers an important research library, through which we can easily access a significant number of national and international journal articles. The search was conducted in the first semester of 2021 and included all articles published up to July of that year.

For the search and selection of articles on the CAPES Portal, we inserted the descriptor Active Methodology in the general search field, without setting a time period, initially listing a total of 3714 articles. From this, we defined more specific criteria (see Chart 1) and conducted an initial indexing to determine the choice of articles that would make up the research sample. The research steps are systematized in Chart 1.

Chart 1: Sample Constitution

Steps	Number of Articles	Actions
Search on CAPES Portal	3714	Descriptor: Active Methodology
Inclusion Criteria	255	Inclusion of peer-reviewed articles; articles in Spanish, English, and Portuguese
Application of a new inclusion criterion	73	Inclusion of articles containing the descriptor active methodologies in the title or subject
Initial Indexing	73	Reading and indexing of abstracts and sections. Identification of title, author, keywords, teaching, year, objective, highlight
Exclusion Criteria	50	Application of the exclusion criterion: articles not found for full reading
Definition of the research protocol to be conducted via Google Forms	50	Definition of criteria and aspects to be investigated in the selected articles
Full Reading	50	Full reading of the articles and completion of the form on the Google Forms platform

Source: Authors, 2021.

Based on the inclusion and exclusion criteria and the initial indexing, we selected a total of 50 articles from different fields of knowledge, which are part of this research sample. Prior to reading the full articles, the researchers defined the items that should make up the Google Forms[5] research protocol, namely: email, article link, article title, publication journal, authors, institution(s), definition of Active Methodology (AM) used by the author(s), definition with which the author(s) identify (if evidenced), theoretical framework (authors cited for the definition of AMs), epistemology (which theory supports the framework), type of research, methodologies cited, technologies adopted, and relevant information.

Each researcher was responsible for reading a block of eight or nine articles, filling out the research protocol, and preparing a summary of each article. The articles were then presented and discussed in the research group during remote meetings, where the points considered relevant were

[5] It is considered a tool that allows the creation of online forms and surveys, enabling the insertion and analysis of responses in real time. In the case of group surveys, this tool allows all participants to simultaneously enter information.

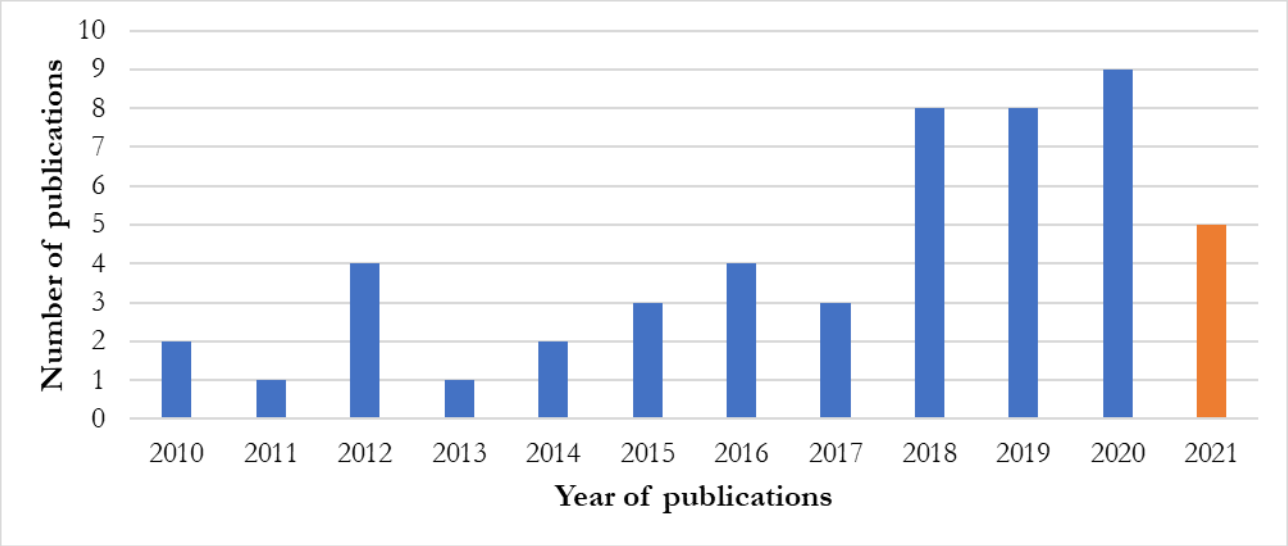
exposed, and the group commented on and noted aspects that seemed related to other articles. All these data make up the analysis material, parts of which are presented in this article.

RESULTS

General Description of Analyzed Articles

In analyzing the articles gathered in the sample, we found studies spanning a period of ten and a half years, from 2010 to the first semester of 2021. We observed that between 2010 and 2017, the average number of publications was three articles per year. From 2018 onwards, there was a substantial increase in work on Active Methodologies (AMs), with an average of nine publications per year, as shown in Figure 1.

Figure 1: Graph of the Number of Publications on AMs per Year



Source: Authors, 2021. Note: The year 2021 was studied until July.

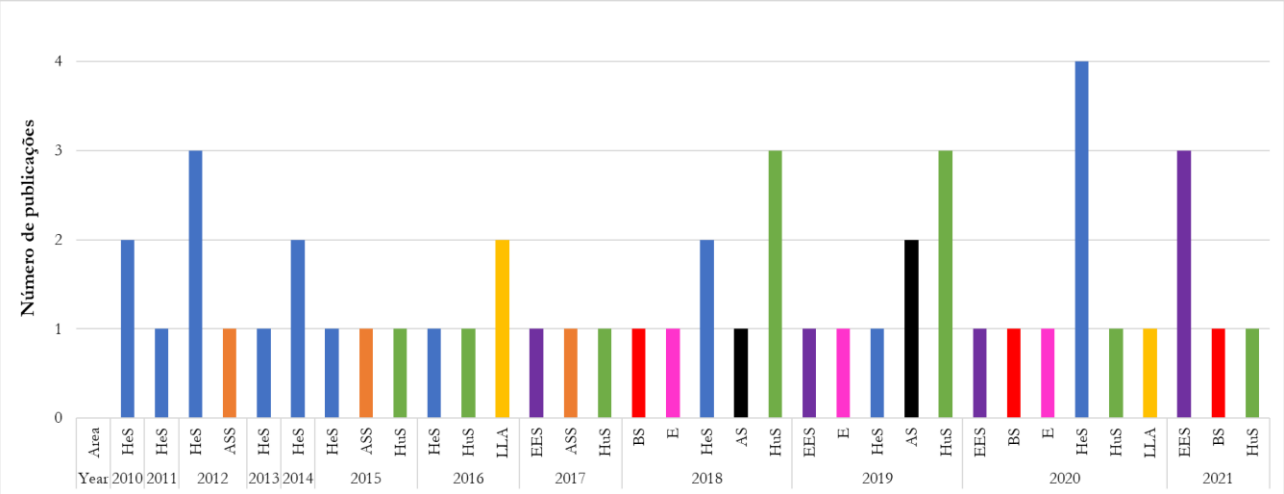
Regarding the areas of knowledge covered by the articles, the Health Sciences area is predominant, with 18 works, corresponding to 36% of the total, followed by the Humanities with 11 works (22%), Exact and Earth Sciences with six works (12%), Biological Sciences, Engineering, Agricultural Sciences, Applied Social Sciences, and Linguistics, Literature, and Arts with three works each (6%).

We highlight that in all the works constituting this study, the authors were concerned with addressing different AMs that contributed to teaching and learning in various fields of knowledge.

Given this, we notice that the predominance of publications in the Health Sciences area is distributed among Nursing, Medicine, Dentistry, Pharmacy, among others. In contrast, within the broader field of Humanities, there is a concentration of works in the sub-area of Education.

The data indicate that the Health Sciences area is a pioneer in studies on AMs, with publications starting in 2010. Other areas of knowledge began publishing from 2012 onwards, with the Applied Social Sciences area, and a real diversification of fields occurred only in 2015, as presented in Figure 2.

Figure 2: Graph of Publications on AMs by Year and Area of Knowledge



Source: Authors, 2021. Legend: HeS – Health Sciences, ASS – Applied Social Sciences, HuS – Human Sciences, LLA – Linguistics, Literature, and Arts, EES – Exact and Earth Sciences, BS – Biological Sciences, E – Engineering, and AS – Agricultural Sciences.

Regarding the educational levels at which the research was conducted, we have a concentration of publications in Higher Education, with 31 works (62%). Of these, 28 works (56%) are at the undergraduate level and three (6%) in postgraduate programs. This accumulation of work in undergraduate studies (56%) and in the Health Sciences area (36%) suggests a relationship between the area and the level of education, which warrants further investigation. This finding leads us to reflect that the concentration of AMs in higher education courses in the Health Sciences is due to the greater application of theories studied in these courses. However, this does not preclude the incorporation of AMs in Basic Education.

For detailing, we note that in Basic Education, 30% of the works were published, with seven (14%) in Elementary Education, four (8%) in High School, and one in Adult Education (EJA), with three (6%) works where the authors did not specify the level within Basic Education. Additionally, there are four works (8%) in technical education, without specification if it is at the secondary or higher technical level.

Concerning geographic distribution, the Southeast region has 19 works (38%), with 11 from the state of São Paulo; the South region has 10 works (20%), with six publications from the state of Rio Grande do Sul; the Northeast region has nine works (18%), with four from Ceará; the Central-West region has eight works (16%), with three from the Federal District; and the North region has only one work (2%), from the state of Pará.

It is worth noting that besides Brazilian works, this survey includes three foreign works: from Vila Real/Portugal, Antofagasta/Chile, and Seville/Spain.

General Characteristics of Active Methodologies and Definition

From the articles analyzed in this research, we were able to identify several characteristics of Active Methodologies (AMs) that led us to a definition. It is important to note that not all authors explicitly present these characteristics; sometimes, the articles focus on a specific type of methodology

(such as PBL, the Problematization Methodology, among others) that the authors consider as an active teaching and learning methodology. Based on this, we can extract the characteristics of this AM. Therefore, the characterization of AM can be derived from the description of a specific methodology used by the authors in a classroom context.

Charts 2, 3, and 4 present a synthesis of the elements found in the 50 articles analyzed. This synthesis is anchored in the ability to observe how teaching, students, and teachers are characterized when the authors discuss AMs or a specific AM. We emphasize that these Charts highlight the most prominent characteristics in the articles rather than their frequency in the studies, gathering representative information of what the authors consider as AM, presenting the characteristics from each of the mentioned contexts' perspectives.

In Chart 2, we summarize how the authors characterize AM from the perspective of teaching.

Chart 2: Characterization of AMs in Relation to Teaching

Teaching
Teaching aims to develop a critical sense regarding what has been learned.
Developing skills that allow applying acquired knowledge in the real world.
Developing reflective and humanistic skills through contact with reality.
Knowledge constructed collaboratively.
Knowledge construction integrating practice and theory in each pedagogical experience.
Theoretical principle of autonomy, "learning to learn."
Developing cognitive, personal, and social skills, requiring characteristics like proactivity and collaboration from students.
Teaching based on problematization as a teaching-learning strategy.
Teaching centered on the effective participation of students in constructing the learning process, which occurs in a flexible, interconnected, and hybrid manner.
Forming critical and reflective subjects. Critical, interactive, and reflective pedagogy.
Students experience real problems and situations related to their existence: developing autonomy.
Developing reasoning and capacities for intervention in one's reality; collaboration and cooperation among participants.
Action-reflection-action processes.
Activities that stimulate greater engagement with contextualization, interdisciplinarity, and problematization.

Source: Authors, 2021.

In Chart 2, we observe that teaching in AMs is geared towards pedagogical objectives such as developing students' critical/reflexive sense and various skills/competencies. The characterization of teaching also refers to the format in which it occurs in AMs, i.e., through collaboration among students, linking theory and practice, problematization, and developing logical reasoning, culminating in the enhancement of competencies and the application of knowledge in real situations.

In Chart 3, we present the characteristics concerning the students' role in an AM, highlighting their classroom activities and their relationship with learning.

Chart 3: Characterization of AMs in Relation to the Student

The Student
At the center of the teaching and learning process.
Protagonist and active within their learning process.
Active participation in their learning and knowledge construction process.
Acts as an agent of social transformation, detecting real problems and seeking solutions. In this perspective, students work collaboratively.
Builder of their own knowledge and author of their achievements. Active role in their formation.
Capable of self-managing their learning process, highlighting autonomy.
Takes on the role of protagonist, assuming responsibility for their learning by engaging with it directly, participatively, and reflectively.
Autonomous and curious in acquiring their own knowledge, capable of making decisions.
Takes an active and critical stance towards learning.

Source: Authors, 2021.

The idea of student protagonism appears in all the articles and can be observed in Chart 3. This concept emphasizes the student's commitment to learning, positioning them at the center of the teaching and learning process. AMs are teaching strategies centered on the effective participation of students in constructing the learning process, in a flexible and interconnected manner, where the responsibility for knowledge acquisition is placed on the student, fostering a more participative and critical approach.

In Chart 4, the characteristics related to the teacher during the development of activities from the perspective of Active Methodologies (AMs), concerning their role in the classroom and their interaction with the students, are presented.

Chart 4: Characterization of AMs in Relation to the Teacher

The Teacher
Facilitator and mediator of educational actions.
Focus not centered on the teaching professional.
Activities mediated by the teacher, who assumes the role of learning facilitator.
Dialogue between educator and learner, valuing professional life knowledge and experiences.
Acts as a supporting facilitator of experiences.
Mediator of actions that allow students to take active roles in their teaching and learning process.
Provides opportunities for student voice, values their opinions, practices empathy, and responds to questions.

Source: Authors, 2021.

From Chart 4, we observe that the teacher's role becomes that of a mediator, guiding actions and bridging the gap between action and knowledge. This allows students to take active roles in their teaching and learning process, revealing their previous experiences to become better equipped to deal with various problems and social contexts.

From the presented characterization, we can highlight that teaching supported by the idea of AM has a strong influence on critical education, emphasizing learning **with** and **within** the student's reality and "learning to learn." This type of education is associated with Paulo Freire's considerations, although this author was cited by only a few authors of the analyzed articles. Blended learning and the use of

technologies appear in some works, but the focus is on the type of teaching rather than the mode of teaching or the use of technological resources.

Problematization stands out in many articles, sometimes explicitly mentioned and other times described as "learning through problems" or problem-situation. The emphasis is on learning through solving real or simulated problems related to the student's reality or professional situations, given that most articles report activities developed in higher education, aiming at professional training.

In this context, it is noticeable that the articles focus on the student rather than the teacher, with many articles not even mentioning the teacher's role, as seen in Chart 4, where there are fewer references to the teacher compared to the student and teaching modes.

Based on the analyzed articles, we can define **Active Methodology as a set of methodologies aimed at a critical and problematizing education of reality, focusing on the student as the protagonist of their learning. The student is at the center of the knowledge construction process, anchored in the idea of autonomy and critical-reflexive thinking. In this context, the student is active in their learning, and the term "active methodology" can be replaced by active learning, as used in other countries, such as "active learning" in the USA.**

Theoretical References Used by the Authors

In analyzing the theoretical references presented in the articles to support AMs, we aimed to identify the perspectives adopted by the authors. In this regard, the following researchers are mentioned: Paulo Freire, John Dewey, Ausubel, Vygotsky, Zabala, António Nóvoa, Philippe Perrenoud, and Edgar Morin.

Initially, we highlight the theorist Paulo Freire, referenced in eight articles to support AMs and other discussions. Freire's ideas converge towards understanding an education that is constituted within the reality in which students are immersed, within their historical-social and cultural context, which must be reflected upon and problematized. Discussions also emerge about the perspective of autonomy, which views the student as the protagonist in the learning process, considering the previous knowledge they have produced (COTTA *et al.*, 2010; PRADO *et al.,* 2012; VIEIRA; PANÚNCIO-PINTO, 2015; GARCIA; OLIVEIRA; PLANTIER, 2019; VEIGA *et al.,* 2020). Generally, these works encompass the conception of "[...] a vision of liberating education, aimed at social transformation, believing that individuals need to educate and become aware of their role, duties, and rights in society" (SILVA *et al.,* 2020, p. 3).

Regarding Dewey's contribution to the constitution of AMs, it is considered that from a problem, the individual who recognizes it conducts discussions and hypothesizes solutions (solving a problem), aligning with how people normally learn. The individual's experience should also be considered, reconstructing it, expanding knowledge, and enriching the spirit, rather than merely transmitting content (MARTINS *et al.*, 2016; LIMA, 2017; OLIVEIRA; FARIA, 2019).

The articles also reference Ausubel's theory of meaningful learning to construct a definition of AM, highlighting that there are two distinct forms of learning. One is based on memorization without a hierarchy of importance, and the other is considered true meaningful learning, where knowledge acquired by students becomes part of their repertoire. According to this theory, the student does not enter the classroom without prior knowledge but with a set of previously acquired knowledge, requiring the teacher

to ground these knowledge pieces for meaningful learning to occur (MORAES *et al.,* 2014; OLIVEIRA; FARIA, 2019).

Vygotsky's contribution refers to the role of language in the individual's development, considering the historical-social context in which they are immersed, centralizing the theory on the interactions established by the individual in their social relations and with their environment. These interactions can be intra or interpersonal, establishing contact with individuals and their contexts, appropriating knowledge and making sense of the world (OLIVEIRA; FARIA, 2019; MARQUESI; AGUIAR, 2021).

Although Zabala and Nóvoa are not referenced to substantiate AMs, they are cited to justify the need for schools to seek new teaching methodologies. For promoting learning, the school must consider the importance of knowledge and new ways of thinking, as the enhancement of cognitive abilities by the teacher influences other capacities. In this context, the theorists Philippe Perrenoud and Edgar Morin are employed in discussions about educommunication, a methodology that reflects on the formation of individuals, developing reflective attitudes and competencies (SANTOS; GHISLEN, 2019).

From the general overview presented, we can observe that the theoretical perspective adopted by the authors is that learning occurs from the knowledge acquired by students and duly grounded by the teacher. Different teaching methodologies can be adopted for meaningful learning to occur, such as problem-based learning, flipped classroom, Maguerez circle, educommunication, among others. All these methodologies are considered Active as they carry their essential characteristics. The articles also highlight the importance of language and interaction conducted by students, either among peers or with the teacher, considering the environment they are in, a process that shapes and transforms social relationships.

Therefore, schools and teachers need to adopt new teaching methodologies that consider the importance of learning and the students' environment. If the student acts upon their reality, they assume a critical-reflective stance, moving away from an education based on memorization.

Lastly, we emphasize that not all articles brought discussions anchored in established theories. Unlike the previously mentioned, some do not present theoretical or epistemological foundations on AMs but merely report the inclusion of AMs in didactic activities.

Methodologies Considered Active by the Authors of the Articles

In the articles examined in this study, we observe that some authors use the perspective of Active Methodologies (AM) in a general sense without specifically referring to a teaching methodology, while others cite specific methodologies in their work, considering them Active. It is also important to highlight that not all the methodologies cited were effectively used/employed in the practice of the researchers/educators in the different articles investigated, as some were only mentioned or theoretically explained. In this section, we present the basic foundations of each of the methodologies described by the authors as Active.

The panorama of methodologies presented in the articles highlights Problem-Based Learning (PBL), which was cited in 12 works. The Problematization Methodology appears in eight articles, and Project-Based Learning and the Flipped Classroom are mentioned in six articles. Gamification and Team-Based Learning are discussed in three works, while Case Study and POE (Prediction-Observation-

Explanation), Hybrid Teaching, the Constructivist Spiral, and Peer Instruction (PI) are covered in two articles. The other methodologies to be presented next appear in one article each.

Next, we briefly present the basic foundations of the methodologies considered Active and present in the analyzed articles.

Problem- Based Learning (PBL), originated in the field of medical education, having been first proposed as a curricular approach for the Medicine courses at McMaster University in 1969 in Canada (Berbel, 1998), with the aim of improving the professional training of doctors. In this methodology, real or simulated problems are used to stimulate the study of specific content, so that students, organized in small tutorial or collaborative groups, jointly propose alternative solutions to the problem (Berbel, 1998; Covizzi; Andrade, 2012). PBL is now developed in various countries and in many different fields of knowledge. Teaching and learning from PBL seek to develop competencies, skills, attitudes, and values (Covizzi; Andrade, 2012).

The **Problematization Methodology** was initially proposed by João Bordenave and Miguel Pereira in 1982, and its starting point was Freirean thought, taking into account the reality of the subject (student), their experience, and their prior knowledge (Vieira; Panúncio-Pinto, 2015). It is believed that the origin of this methodology is related to Charles Maguerez's Arch Method, which was later adapted and described as the problematization methodology by Bordenave and Pereira (Lima, 2017). Generally, students start from a "naive" observation, and in the development of the stages of the Arch, the teacher and students actively participate in the problematization and the construction of an intervention in reality.

Charles Maguerez's Arch is a teaching-learning strategy for developing problematization that consists of five stages happening from social reality: 1. Looking at reality: students' observation of aspects of their reality that can be studied, worked on, reviewed, and improved; 2. Identification of key points: the subjects analyze what was observed and choose what they consider most important, selecting the points and variables of the situation; 3. Theorization: the moment when students perceive and question the problem, taking into account that through well-elaborated theorization, the student understands the problem through mental operations; 4. Identification of solution hypotheses: development of alternatives for solving the proposed problem, confronting theory and practice; and 5. Application to reality: the moment when individuals construct knowledge (Prado *et al.,* 2012).

According to Bender (2014), **Project-Based Learning (PBL)** can be defined by the use of authentic and realistic projects (based on problems) aimed at promoting the teaching of content and their resolution by students, in a cooperative manner. The projects are related to performing tasks and constructing artifacts/items produced throughout their execution, which can be used to demonstrate the knowledge acquired by students, thus representing the possible solution to the problem. This teaching model encourages the use of digital technologies that can assist in the execution of the project (Bender, 2014). Examples of products built from PBL include multimedia presentations, practical demonstrations, functional prototypes or models, portfolios, podcasts, videos, among others.

In the **Inverted Classroom** model, there is a reversal in the teaching format where the theory is studied at home, online, and the classroom space is used for discussions and the resolution of activities, among other proposals (Bacich, Neto, & Trevisani, 2015). Thus, what was traditionally done in the physical classroom context (e.g., content explanation) is done at home, and what was done at home (e.g., applying activities on the content) is performed in the classroom (Bacich, Neto, & Trevisani, 2015; Bergmann & Sams, 2018). According to Bacich, Neto, and Trevisani (2015), this model is valued as the gateway to hybrid teaching (Bacich, Neto & Trevisani, 2015).

Gamification can be understood as thinking like in a game, using the systems and mechanics of gameplay in a non-game context, in a real situation (Busarello, Ulbricht, & Fadel, 2014; Murr & Ferrari, 2020). According to Murr and Ferrari (2020), this creates a simulation within a real situation. In the educational context, this approach uses game elements to promote a motivational and conducive environment for learning, where students are engaged in problem-solving. However, it's important to note, as Murr and Ferrari (2004) point out, that gamification does not necessarily involve participating in a game but rather employs relevant aspects like aesthetics, structure, strategies, and thinking methods to achieve motivation, problem-solving skill development, and learning (Busarello, Ulbricht, & Fadel, 2014).

Team-Based Learning (TBL) was proposed by Larry Michaelsen in the late 1970s at the University of Oklahoma. The goal was to shift learning from passive to active, which in this methodology occurs through problem-solving and teamwork, with active interaction among students (Ruiz-Campo, Soria-Barreto & Zúñiga-Jara, 2016). TBL consists of the following phases: 1. Individual work/study before the class; 2. Individual test, group discussion, collective discussion, and teacher feedback; 3. Explanation of concepts and assignment submission. Tasks in a TBL model should be planned based on a unique and significant problem for students, for which they must present only one possible solution.

The **Case Study** method, also known as the **case method**, was developed in 1880 by Christopher Langdell, a professor at Harvard Law School (Menezes, 2009). The pedagogical study provided by this methodology occurs from real cases, usually aimed at professional training in a specific area, where teachers propose cases encompassing contexts related to justice processes, companies, hospitalized patients, technological advancements, environmental issues, among others, to enable students to reflect and analyze real situations and thereby study/learn various content. Currently, the case method is adapted to different fields of knowledge and educational levels. According to Cesar (2005), the case developed for didactic use should involve real-life situations, with facts, opinions, and biases related to it that are being conveyed by different sources or media. Thus, a complex case can be constructed to present real situations that allow students to develop analyses, discussions, and make decisions on the type of actions to be taken in a real situation (Cesar, 2005).

According to Oliveira (2003), the methodology known as **P.O.E. (Predict, Observe, Explain)**, proposed by Nedelsky in 1961 and later by White and Gunstone in 1992, is characterized by three stages: 1. The teacher presents a challenging problem to students, who can solve it individually or in teams. The challenge is presented as a question that arouses the interest and curiosity of the students, prompting them to think of a solution. The students (organized) discuss the question and, through the exchange of personal experiences or individually, PREDICT or propose some hypotheses for its solution; 2. The experiment is carried out by the teams or the teacher for the students to OBSERVE the phenomenon; 3. The students try to EXPLAIN the phenomenon, confirming or not their initial hypothesis. In this (social) stage, each student contributes to solving the problem, and it is also where each student organizes their discoveries within a conceptual model. This stage is crucial, as it is through the interaction among group members and the contributions presented that a new element may emerge to solve the initial problem (Oliveira, 2003).

Blended Learning (BL) is a pedagogical approach that combines/mixes face-to-face activities and online activities conducted with the aid of digital information and communication technologies, which can occur outside the physical classroom context (Bacich, Neto, & Trevisani, 2015). Blended learning can also involve combining various methodologies. Different proposals are available in the literature for combining these activities, but generally, the student studies the material in different

situations and environments, and the classroom becomes the place for active learning, where problem-solving or project activities, discussions, laboratories, among other activities, are carried out with the support of the teacher and collaboration among peers (Bacich, Neto & Trevisani, 2015).

According to Gehlen, Maldaner, and Delizoicov (2012) and Auth (2002), **Study Situations** follow a systematic dynamic in three stages: 1. Problematization: explanation for the initial understanding that students have about a specific problem, where the student is challenged to solve problem situations based on their experience; 2. First elaboration: deepening stage through texts that address the topics discussed in the problematization, being the first contact of students with scientific knowledge; 3. Elaboration and conceptual understanding: the student revisits the initial questions presented in the problematization stage to conceptually understand what was presented. By forming conceptual thinking, the student will be able to understand new situations beyond the one presented in the study situation they encountered (Mori & Cunha, 2020).

Problem Solving is related to a didactic-pedagogical approach that involves proposing problems and subsequently resolving them in an educational context. Initially developed by George Polya in the 1980s, this methodology was geared towards Mathematics but is now adapted and widespread across various fields of knowledge (Oñorbe, 2003). In this approach, the problematic situation can be broad or specific, aiming to facilitate both problem-solving by students and the development of skills and learning of diverse content (Marques & Cunha, 2018). The literature indicates numerous possibilities for enhancing this methodology, which may depend on factors such as the teacher's pedagogical intention, the organization of the problem(s) within the curriculum planning, the degree of participation and freedom given to students in the process, the nature and characteristics of the proposed problem(s), as well as the procedures and attitudes developed in the problem-solving process by students (Oñorbe, 2003).

The **Constructivist Spiral** was proposed by Valéria Vernaschi Lima in 2017, based on the principles of PBL, constructivism, Ovide Decroly's principle of globalization, among other perspectives. The constructivist spiral involves stages (movements) that occur throughout the process, which the author calls "identifying problems," "formulating explanations," "elaborating questions," "constructing new meanings," and "evaluating processes and products" (Lima, 2017).

Peer Instruction (PI) is characterized by learning through debates among students, stimulated by theoretical multiple-choice questions aimed at identifying their difficulties and generating reflections on challenging concepts. The methodology involves a brief content presentation followed by the application of multiple-choice questions, initially answered individually. When the rate of correct answers is unsatisfactory, i.e., less than 70%, students are organized into small groups to debate the knowledge addressed in the questions. In this methodology, the use of technologies—such as an electronic questionnaire available on the Google Forms platform—enables immediate submission and analysis of responses (Araujo & Mazur, 2013; Garcia, Oliveira & Plantier, 2019; Marquesi & Aguiar, 2021).

Investigative Science Learning Environment (ISLE) is a proposal for students to learn similarly to how scientists do. The procedure involves observing, finding patterns, constructing and testing explanations for these patterns, and using representations of a particular phenomenon (Parreira, 2018). The organization of the class is similar to practical laboratory sessions, where students work from a guide. However, in this methodology, they do not merely verify what is seen in theory but rather reconstruct a law from the guide using investigative practices, akin to the work done by a scientist.

Students construct concepts through problem-solving and practical situations proposed to them, leading to discussions on how knowledge is produced and its limitations.

The **Practical Lesson Model (PLM)** encompasses the following steps: concept, design, execution/fabrication, testing/evaluation, and conclusion (Carmo, 2018). According to Carmo, the Active Methodology—Practical Lesson Model (PLM) aims to expand and consolidate students' knowledge, skills, and competencies, contributing to course activity planning by allowing the teacher to identify weak points to be addressed in the classroom, recognize individual and collective problems interfering with learning, and enable students to collaboratively plan the stages involved in a practical experiment. This proposal allows students to work (under the teacher's guidance) in the collective construction of experimental apparatuses or prototypes, encompassing theorization, analysis, synthesis, reflection, and knowledge expansion.

RPGs, or Role-Playing Games, can be translated as "role-playing games" or "character interpretation games." The idea is to create a story like an improvised theater. The enactment involves a director, called a narrator or master, who explains the plot's unfolding, and several players who modify the story as each one interprets a character. In education, RPG presents a problem situation where students face circumstances that need to be resolved to stay in the game. The experiences in the game must be prepared to develop some curricular content or study topic. RPG requires cooperative resolution, meaning there are no winners, as all unite for a common purpose. The plots consist of key situations, called "narrative knots," from which the story unfolds, allowing students to be protagonists of their knowledge. According to Amaral, Martins, and Mariano (2020, p. 38), "being part of a game, and being interested in it, students/players would be able to learn, dedicate themselves, exercise imagination, and be resourceful to solve problems, capacities that match the skills applied in RPG."

The **Three Pedagogical Moments** proposed by Angotti and Delizoicov (1990) and further investigated by Delizoicov, Angotti, and Pernambuco (2002) are associated with the transposition of Paulo Freire's thematic investigation approach. Thus, based on the definition of a Generating Theme (Paulo Freire), the Three Pedagogical Moments are developed to address a theme in the classroom, organized into three stages: initial problematization, knowledge organization, and knowledge application (Angotti & Delizoicov, 1990; Delizoicov, Angotti & Pernambuco, 2002).

The concept of **Digital Learning Objects** was originally coined by David Wiley, "for whom learning objects are digital components designed for use and reuse in teaching and learning activities" (Wiley 2000 *apud* Forneck, Fuchs & Bersch, 2015, p. 210). The idea is related to the possibility of organizing educational content in different formats such as games, videos, animations, and virtual environments. Digital learning objects are associated with producing educational materials with interactive technological resources.

Concept Maps are graphical tools for organizing and representing knowledge and can be considered an Active Methodology (AM) when there is an interaction between individual and collective knowledge. In this format, students individually develop a concept map on a sheet of paper and later share the maps with their peers, explaining the relationships. The next step is to construct the concept map with the aid of Digital Information and Communication Technologies (DICTs), created using CmapTools software, which can be enhanced with internet research and information provided by the teacher and classmates (Novak & Cañas, 2010; Gewehr, Neide & Dullius, 2018).

Educommunication is a link between the fields of education and communication, contributing to the teaching and learning process. This methodology "greatly arouses student interest, as it is known

how much new generations are immersed in the technological and digital universe. Although some teachers are taking tentative steps in this direction, students are light years ahead" (Santos & Ghisleni, 2019, p. 3). Educommunication assumes that the communication process is ongoing since students are constantly in contact with information and technologies. The central idea is to use this reality to enhance teaching and learning.

Storytelling is the art of telling stories using techniques inspired by screenwriters and writers to convey a message in an unforgettable way. According to Loures (2018, p. 23), this is a technique of producing and telling stories that are characterized by being short or serialized, dealing with significant everyday achievements, providing teachings, and conveying ideas or concepts enriched with various sources. In creating and developing a narrative, the student engages with the content, and the teacher performs their guidance work.

Summaê is a strategy developed by Fragelli and Fragelli (2017) that constitutes an Active Methodology transforming the learning space into a playful and creative environment. The name Summaê combines the word "summae" (Latin for sums) with the circumflex accent (^) representing the union of people to study a specific theme, where everyone wears a hat (Fragelli & Fragelli, 2017). All participants wear hats to make the environment more playful and less traditional than the classroom setting. The proposal is to stimulate students through questions formulated by themselves and presented through creative videos. According to Rosado *et al.* (2020), this strategy comprises seven stages: 1. Video presentation; 2. Time for solutions; 3. Presentation of solution or expert's version on the issue; 4. Criteria for correction; 5. Opportunity for small debates and self-correction by students; 6. Top hats and top videos; 7. Final challenge.

Field Study can be understood as a set of didactic activities based on an interdisciplinary approach aimed at studying through direct contact with the environment, which can be rural or urban (Lopes & Pontuschka, 2009). In this study, interaction occurs not only with the environment but also through contact with people living in the area to understand the environment and established social relationships. It is a guided insertion in a specific geographical space, allowing students a critical and investigative look at environmental, social, and economic issues. Activities should be primarily collectively planned by teachers, demanding an interdisciplinary perspective on a given environment. Teachers organize a guide, and students (organized into groups) work on the proposed activities to later discuss them collectively (Lopes & Pontuschka, 2009).

In conclusion, we identify the existence of 24 different active methodologies, some widely disseminated, such as Problem-Based Learning, Problematization Methodology, and Charles de Maguerez's Arc, and others less known and cited less frequently, such as Summaê, Storytelling, and Role-Playing Games. In general, they present some common characteristics, providing greater student involvement in pedagogical activities and confirming that there are multiple possibilities for developing active methodologies and promoting more meaningful and dynamic teaching and learning processes.

This diversity of active methodologies can be explained by the authors' diverse conceptions of how to develop classroom pedagogical practices, among other aspects (Araujo, 2015). Additionally, it is essential to consider that there is no consensus on how to operationalize active methodologies. Instead, there are different possibilities, and some constitute congruent theoretical and critical bases but are not absolute (Paiva *et al.*, 2016). This means that when authors employ them in specific classroom contexts, they can make theoretical-methodological adjustments or adaptations to their proposals and can also "create" their configurations of Active Methodology.

REFLECTION ON ACTIVE METHODOLOGIES

As we highlighted, the 21st century prompts us to reflect on teaching and learning, especially focusing on the "Alpha Generation" of students born in the age of technology. This generation tends to be more independent and has a greater ability to solve problems. However, we emphasize that the use of technology in the classroom is not the primary factor for teaching and learning but rather an ally that can be used as a tool for diverse and engaging teaching for a generation immersed in technology.

Based on the results of our research, we can make some considerations, such as the substantial growth in research on active methodologies in the past four years (2017-2021). These data indicate an interest in the topic among researchers and educators, especially in certain areas of knowledge. We observed a prevalence of research in the Health Sciences, followed by the Humanities, Exact and Earth Sciences, Biological Sciences, Engineering, Agricultural Sciences, Applied Social Sciences, and Linguistics, Letters, and Arts. One possible explanation for the higher number of studies in the Health Sciences is that practical activities are part of the development of course subjects. We note that some analyzed articles mention activities such as Case Studies presented to students as hypothetical or real cases for which hypotheses are raised and practical tests are performed for resolution.

In quantitative terms, the analyzed studies are concentrated in Higher Education publications (70%), including technical education, undergraduate, and graduate studies, with a predominance in undergraduate (56%). This leads us to question the low insertion of Active Methodologies (AMs) in Basic Education, with only 30% of publications, prompting relevant reflections: shouldn't the change in education begin with Basic Education so that students get used to a work method where they are the protagonists of their learning?; are AMs not being used in Basic Education, or is there no research in this segment?; or do teachers use AMs but are unaware that it is an AM? In this sense, specifically regarding research in Basic Education, we understand that changing this scenario involves encouraging/investing in teacher training so that AMs become a working tool in schools and making AMs a research topic in the field of Education to foster discussions for Basic Education.

According to Soares (2021, p. 36), the premises of the National Common Curricular Base (BNCC) include "bringing digital tools into the classroom, exploring new communication means and environments, placing students at the center of the learning process, fostering discussion, and developing skills." In this context, it is important to reflect that the fact that it is not published in an article does not mean that the teacher does not consider these premises and does not develop an AM in their class. On the other hand, this study concludes that AMs have gained more strength in Higher Education.

Another issue that prompts reflection is the use of digital tools in activities based on an AM. As students are in the technological era, it is expected that the teacher has the skill and dexterity in handling digital technologies. This does not mean that all AMs use technological tools, but it is observed that this is a trend in current teaching, especially in the post-pandemic period.

Regarding the program content (a major bottleneck for innovations in Basic Education), it is worth noting that the presence of AMs as a teaching strategy does not exempt from fulfilling this content. On the contrary, the content remains relevant, and its full development must be met according to school guidelines. The idea is to modify the way of presenting the content, which can be done through problems.

In this perspective, we highlight that a large part of the articles presents "problematization" as a teaching strategy, which can be worked with real or simulated problems, according to the student's reality or the context of the content addressed related to the academic career.

Regarding a clear definition of Active Methodology, our analysis shows that most authors present the characteristics of what they consider an AM but do not provide a clear definition. Moreover, in many articles, we find the presentation of a specific methodology, such as PBL, problematization methodology, among others, and from it, the characterization of what the author considers an Active Methodology. Thus, it seems that there is no clarity for the authors about what AMs are or encompass, which is a need to be considered by researchers, i.e., articles need to present a theoretical-methodological position on AMs.

Considering the above and aiming to contribute to the understanding of AMs, we have grouped characteristics to arrive at a definition of Active Methodology, encompassing, from our perspective, the few definitions explicitly stated in the analyzed articles. It is important to highlight that there is a panorama of AMs where the student is the central agent, with the teacher's role being that of a mediator in the teaching and learning process. An AM focuses on student protagonism and learning by doing.

Additionally, many methodologies appeared as being considered by the authors as AMs, and some of them are present in more than one study, such as Problematization Methodology, Project-Based Learning, and Flipped Classroom, among others presented in this work. It is worth noting that regardless of the methodology, the central ideas lie in student protagonism (active participation in a critical and reflective manner) and the teacher's role as a mediator (not always defined in the articles).

Some methodologies mentioned in the articles (PBL, Project-Based Learning) are well-founded in the literature and can be said to predate the emergence of the term "Active Methodologies." Why, then, has the term AM gained so much prominence at this moment? Why are AMs now "emerging" as the salvation of traditional teaching? Perhaps there is a well-grounded propaganda at a time when teaching is so debated, as we have the new BNCC, as well as the New High School entering Brazilian education in 2022. In other words, there is a movement of change (even if debatable) for the rise of AMs and their promotion as a solution to some teaching-learning problems.

Reflecting on the definition of AM and considering our research group's experience, we can think that not all classes, subjects, and content fit the use of a specific AM. Thus, when addressing a strictly theoretical subject (in Higher Education), it makes less sense to use AM. Conversely, for practical and experimental subjects where a problem-question can be proposed, and the student is asked to propose alternatives for its resolution, conducting classes through AMs makes perfect sense and would change the context of what is taught and how it is taught.

Also, in this research, the lack of reference to Inquiry-Based Learning (IBL), a well-known approach in Science teaching with characteristics of Active Methodology, draws our attention. IBL focuses on student action in a problematized situation. This approach has different possibilities for its development but generally includes stages such as an initial problem, hypothesis formulation, hypothesis testing, group knowledge systematization, and a conclusion stage, which can be through writing or drawing (Carvalho, 2013). Thus, reflecting on the definition of AM, we believe that IBL has all the characteristics of an Active Methodology, yet it was not mentioned in any of the analyzed articles.

Regardless of the answer to these questions, the lack of studies in Basic Education opens possibilities for new works. It is important for teachers and researchers to develop teaching proposals so that students from the early grades are taught to think and act actively in their learning.

Finally, we consider the limits and difficulties of conducting survey research on a large number of scientific articles and indicate the need for more research on the subject.

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CONFLICT OF INTEREST STATEMENT

The authors declare that there is no conflict of interest regarding this article.