REVISTA BRASILEIRA DE EDUCAÇÃO, CULTURA E LINGUAGEM

[Artigo]

THE METHOD IN EDUCATION TO THE PEDAGOGUE JOHN DEWEY

EL MÉTODO EDUCATIVO DEL PEDAGOGISTA JOHN DEWEY

O MÉTODO EDUCACIONAL DO PEDAGOGO JOHN DEWEY

Alyson Bueno Francisco[1]

ABSTRACT:
John Dewey, an American pedagogue, applied pragmatism in education. The education, according to Dewey, needs to propose a method in the act of acting, in order to be able to transform reality, through the scientific method with democratic practices. The traditional education depended on the finalism of results through written assessments, whose pedagogy of Dewey proposes the elaboration of works with scientific samples and methodologies in groups of students to ensure the educational process in practice through the process. This pedagogy influenced several disciplines of basic education, such as Chemistry by conducting experimental exhibitions by observing experiments in the laboratory; and Geography with the study of the environment through excursions to experience different realities of the lives of students. Based on curiosity and observation, Dewey considers that scientific knowledge becomes accessible to students in basic education and the production of knowledge becomes possible, especially with interdisciplinary activities and educational practices, as occurs in Environmental Education, in order to raise student's awareness and ensure better results in the educational process.

Key words: Process. Acting. Experimental. Interdisciplinary

RESUMEN:
John Dewey, un pedagogo estadounidense, aplicó el pragmatismo a la educación. Para Dewey, la educación necesita proponer un método a través de la acción, para transformar la realidad, a través del método científico con prácticas democráticas. La educación tradicional depende del finalismo con resultados sobre materias escritas, pero el pedagogo Dewey propone la elaboración de trabajos científicos con ejemplos de metodologías de grupos de estudiantes en el proceso continuo de la

[1] PhD in Geography; Teacher Degree in Philosophy; Independent Researcher. Orcid https://orcid.org/0000-0001-7632-9249 . Email: alysonbueno@gmail.com

práctica educativa. Esta pedagogía está influenciada por materias de Educación Básica, como Química, a través del ejemplo de experimentos y observaciones de laboratorio; en Geografía se puede relacionar con estudios ambientales con excursiones y experiencias realizadas por los estudiantes. A partir de la curiosidad y la observación, Dewey considera que el conocimiento científico posibilita, principalmente con actividades interdisciplinarias, a través de las prácticas educativas de Educación Ambiental, mejorar el interés de los estudiantes por el proceso educativo.

Palabras clave: Proceso. Acto. Experimental. Interdisciplinariedad.

RESUMO:
John Dewey, pedagogo estadunidense, aplicou o pragmatismo na educação. Para Dewey, a educação precisa propor um método pelo agir na ação, para transformar a realidade, por meio do método científico com práticas democráticas. A educação tradicional depende do finalismo com resultados sobre assuntos na escrita, mas o pedagogo Dewey propõe a elaboração de trabalhos científicos com exemplos de metodologias de grupos de estudantes no contínuo processo de prática educativa. Essa pedagogia é influenciada por disciplinas da Educação Básica, como a Química, pelo exemplo de mostras em experimentos de laboratório e observações; na Geografia pode estar relacionada aos estudos do meio ambiente com a realização de excursões e experiências vivenciadas pelos estudantes. Fundamentado na curiosidade e na observação, Dewey considera que o conhecimento científico torna possível, principalmente com as atividades interdisciplinares, pelas práticas educativas da Educação Ambiental, para melhorar o interesse dos estudantes pelo processo educativo.

Palavras-chave: Processo. Agir. Experimental. Interdisciplinaridade.

INTRODUCTION

Education has options of methods to achieve the goals planned by educators. Educational methods need to be applied according to the real conditions of schools, whose vertical activities of methods without considering the experiences of educators can affect the educational process.

Educational planning needs to abandon the ends imposed by higher authorities from outside the school units in search of a democratic process, in which the role of

the educator in the policy of the school unit is fundamental to ensure the acquisition of knowledge by the students when they present their particular realities in the community where the school is inserted.

John Dewey (1859-1952) was an American philosopher and pedagogue influenced by the philosophical current of nineteenth-century pragmatism, represented by Charles Sanders Peirce, Josiah Royce, and William James. Dewey acquired importance for the method of investigation used in the scientific field, and his philosophical proposal, in the early years of his career, was marked by instrumentalism, inherited from Anglo-Saxon experimentalism (MBISIKE et al., 2020).

Dewey's conceptions influenced the University of Chicago and this American pedagogue shared Vygotsky's educational ideas, whose knowledge depended on a social process, that is, the individual as an educator acquired knowledge through interaction with society. Through interaction with the environment, the student, in Dewey's view, can create his or her reading of the world, as presented in Paulo Freire's proposal, and achieve the overcoming of reality with environmental and social problems.

For Dewey (2007), knowledge cannot be transmitted as something finished, and a democratic process is necessary for the group of educators and students in the discussions in the face of the results and experiences. Educational planning, according to Dewey's proposal, is a social and democratic process in the face of reality to solve the real problems in the production of school knowledge.

Although pragmatism is currently criticized by contemporaries due to methodological rigor, education professionals can use methodological elements in order to contribute to overcoming educational problems. The need for choices and plans in the educational process is important in order to avoid dependence on antagonistic dualities and the search for consensus to "act intelligently".

Among the main problems of opposites in education, Dewey identified the educator's lack of contact with the students' experiences and the students as simple spectators. The vertical imposition of theoretical knowledge by educators according to

methods external to the school and the lack of questioning on the part of the students were problems identified by the American pedagogue. The proposal to solve these identified problems would be to establish order in the actions when practicing, with the knowledge acquired by doing. In the face of this method, the importance of practical knowledge for actually acting occurs.

In this educational analysis of John Dewey, the philosophical influences of the pedagogue are presented, a synthesis of the thought of the American pedagogue and the pedagogical practices applied in the example of a state school of secondary and technical level.

EXPERIMENTALISM AND EMPIRICISM IN DEWEY'S PHILOSOPHY

The experimental science was the result of many centuries of discussions in philosophy, by which practical knowledge derived from common sense was systematized into concepts and theoretical interpretations for understanding by reason. For Chauí (2000, p. 31) "the Greeks transformed into science (that is, into rational, abstract and universal knowledge) what were elements of practical wisdom for direct use in life".

The Platonic Philosophy was based on the unimportance of sensations and analysis of objects, the knowledge of which was produced only by the intelligibility of the subject in the search for theoretical perfection. Aristotelian philosophy, on the other hand, sought the relation of the subject to the object by the operative intellect in the face of the causal analyses of observable things. On science, Aristotle states:

> Moreover, the sciences do not concern themselves with the essence, but start from it, some by extracting it from experience, others by assuming it as a hypothesis, and demonstrate with greater or less rigor the properties which belong by themselves to the genus with which they are concerned. It is evident that from this inductive procedure neither a demonstrative knowledge of substance nor essence can be derived, but another type of knowledge (Aristotle, 2002, p. 270).

ISBN: 2526-4052 | Volume 8 | Nº 17 | Ano: 2024 – DOI: 10.61389/rbecl.v8i17.8985

Regarding the need for experience as a method of analysis for the production of rational knowledge, Aristotle (2002, p. 07) considers: "[...] He who has experience is considered wiser than he who possesses only some sensible knowledge".

The search for understanding nature through the dynamics of its phenomena was based on empiricism. The origin of empirical philosophy comes from the skepticism of Pyrrhus of Elis (360-270 B.C.), whose Greek thinker influenced Sextus Empiricus (c. III A.D.) who defended the experience of life and the production of knowledge based on the indications of nature perceived by the senses.

Thomas Aquinas (1225-1274) was a philosopher who presented the Aristotelian conception of the production of knowledge based on the perception of the senses and the accumulation of experiences, as he states: "[...] from many things remembered results an experience, and from many experiences results a universal" (AQUINAS, 1973, p. 51). This medieval philosopher highlights the need for the time of experiments: "[...] the men who came to the discovery of such truths only succeeded with difficulty and after a long time of searching" (AQUINAS, 1973, p. 67).

There are literary works that present the mysticism of Alchemy that can be mentioned to students to arouse interest in the area, such as: Dan Brown (The Da Vinci Code), Joanne Rowling (Harry Potter and the Philosopher's Stone) and Paulo Coelho (The Alchemist).

Experimental science was developed in the United Kingdom during the medieval period, more precisely at the University of Oxford, where experimentalism emerged. Roger Bacon (1214-1292) was one of the leading forerunners of astronomy, optics, and space geometry in the Middle Ages. For Bacon (2006):

> In fact, there are two ways of knowing: by argument and by experiment. Argument concludes and makes us conceive the conclusion, but it does not certify or remove doubt in such a way that the mind rests on the intuition of truth, unless it discovers it by experience. Those who wish, therefore, to enjoy the truths of things without doubt must learn to dedicate themselves to experience (Bacon, 2006, p. 95-96).

ISBN: 2526-4052 | Volume 8 | Nº 17 | Ano: 2024 – DOI: 10.61389/rbecl.v8i17.8985

In the Modern Age, Nostradamus (1503-1566) was a physician and apothecary (pharmacist of manipulations) who developed benzoic acid; and the Swiss alchemist Philippus Von Hohenheim (1493-1541), nicknamed Paracelsus, created Biochemistry and Toxicology.

Chemistry was systematized as a science and separated from Alchemy in the seventeenth century with the works of the naturalist philosopher Robert Boyle (1627-1691). The main difference between Alchemy and Chemistry is that the former is just an art endowed with creativity to transform matter and analyzes the phenomena resulting from experiments, while the latter is a science that has theoretical foundations through the studies of the atoms that make up matter and the transformations of matter are explained by the atomic structure of molecules.

Francis Bacon (1561-1626) was an English philosopher who contributed to experimental and inductive studies, because when faced with real problems in his political activity, he considered the importance of scientific knowledge in the society of his time.

For Bacon (1979, p. 18) "the true interpretation of nature is fulfilled with opportune and adequate instances and experiments, where the senses judge only the experiment and the experiment judges nature and the thing itself". In the methodological proposal, Bacon (1979) considers that we should avoid previous judgments of theoretical conceptions and seek experimental data in the field, reformulating the experiments themselves, with the possibility of redoing them and adapting them to field conditions.

Bacon (1979) considers the scientist as a craftsman who possesses the creativity to elaborate experiments and contributes to the progress of science.

The deductive knowledge, despite its importance in human reason and its necessary use even in the elaboration of cartography with Cartesian knowledge, cannot induce us with ideas anticipated to empirical investigation. Bacon (1979, p. 11) states: "[...] It is the ordinary form of human reason to turn to the study of nature in

ISBN: 2526-4052 | Volume 8 | Nº 17 | Ano: 2024 – DOI: 10.61389/rbecl.v8i17.8985

anticipation of nature (because it is a rash and premature intent). And that which proceeds in the proper way, from the facts, we call the interpretation of nature".

Bacon (1979) considers the method as the path to be followed by experience, which is the generator of knowledge through the investigation of particular facts, whose scientist, possessing rigor, has the ingenuity to go through the labyrinth of knowledge.

David Hume (1711-1776) bases his philosophical conceptions on empiricism, considering that ideas can be restricted to causality that occurred in the past and verified by theorists, and the scientist can run the risk of clinging to habits and influencing empirical analyses.

According to Hume (1995, p. 89): "when the cause is present, the mind, by habit, immediately passes to conception and belief by customary effect". Therefore causality influences our minds when we visit the field, and may lead us to judgments dependent on the ideas customary by habit.

This attachment to habit can lead us to build predictive models for the future based on empirical data collected in the past, and it is necessary to avoid it. For Hume (1995, p. 71) "[...] It is not, therefore, reason that leads life, but habit. It alone determines the mind, under all circumstances, to suppose that the future is conformed to the past".

In 19 Century British philosophy, Alfred Whitehead (1861-1947) opposed Greek thinking about the homogeneity of thinking about nature, since the understanding of matter and substance made science pragmatic. In this sense, through our conscious perception, we can know the heterogeneity of nature and think about it through the facts presented in the reality of places.

By considering the forms present in the landscape as a result of transformations and processes, Whitehead (1994) presents an empirical analysis of the totality of nature from a conscious perception of environmental ethics, considering active and experimental nature in the face of the changing world.

ISBN: 2526-4052 | Volume 8 | Nº 17 | Ano: 2024 – DOI: 10.61389/rbecl.v8i17.8985

The contributions of thinkers and philosophical currents to education are presented in the origin and foundations of the methodologies. Empiricism and experimentalism are conceptions that bring educators and students closer to the object of study and how scientific knowledge is close to educational knowledge in mutual contributions (RUIZ, 2013).

DEMOCRATIC KNOWLEDGE AND DOING AND DEWEY'S LIVING SCHOOL

The etymological origin of education comes from action. In this sense, education is a process that occurs through action among people with several obstacles to be overcome and there is no method or plan that is perfectly suited to all educational institutions.

Dewey is one of the thinkers who criticizes the finalist conception of educational goal, whose goal is precisely in the "middle" (temporary end) by actually acting and not in the goal to be achieved. Thus, for Dewey (2007, p. 14) "it is absurd to discuss the objective of education if the conditions do not allow predicting the results and do not stimulate a person to look ahead and glimpse the effect of a given situation".

The educational method presented by Dewey (2007) is based on the experimental, of which the pedagogue states: "the objective, in short, is experimental and, therefore, constantly grows when tested in action" (idem, p. 19). The goal in Dewey's view is only the act of pressing action, that is, the possibility of achieving the goal is valid in the educational process, because we learn from the attempts.

Dewey (2007) compares the educator to a farmer who goes through the need for soil conditions, the climate on his property to prepare the soil, plant, take care of the plantation and harvest the fruits, that is, the results in the face of various situations. It is in the possibility of achieving the results that we learn. For Dewey (2007, p. 18) "it is a method for dealing with conditions, in order to make desirable changes in them". Faced with the conditions in the community and in the school, the

educator seeks a choice and planning for a particular action, whose small actions can change the world.

John Dewey's educational method was applied through the "Active School". Dewey believed in the power of education to ensure social well-being and through democratic practice social reconstruction would be possible. According to Redden and Ryan (1973, p. 79):

> Social experimentalism believes that social institutions and science are instruments by which new experiences can be developed. When used by the school in such a way that the child is given ample opportunity to contribute to the general welfare, these become powerful means for the creation of a new social order. If the purposes of the experimentalist are to be accomplished, the traditional didactic methods must be abandoned and the school must become alive and active. Students should be given practice in social planning, actually carrying it out and participating in the work of social reconstruction through group activity.

In this context, in the mid-1920s, of criticism of the educational traditionalism of the imposition of purposes by the educational authorities and individualism in the rigorous application of theoretical evaluations, Dewey brings us to the current moment of education a need for practical bias and socialization of ideas by democracy in school. The methodologies of group work at the various levels of education contribute to the socialization of students and the possibility of social reconstruction idealized by Dewey.

Regarding the experiences in educational methods, in Hispanic countries there are contributions to a didactic methodological proposal that is closer to activities for students, with methodologies to ensure greater autonomy in the face of local realities (Contreras- Domingo;Lara, 2010).

The proposal of Dewey's Pedagogy for the "living school" was applied in Brazil in the mid-1960s, by the movement for the renewal of the traditional school. The so-called "School of Life" was methodologically applied by the study of the environment,

ISBN: 2526-4052 | Volume 8 | Nº 17 | Ano: 2024 – DOI: 10.61389/rbecl.v8i17.8985

in which the teaching activities sought a relationship between the school and the community where it was inserted.

The Study of the Environment gained an initial adhesion in the so-called "School of Life" in the 1960s, but the Institutional Act No. 5 issued in 1968 stipulated strict measures for Brazilian education, prohibiting the so-called critical and social practices. In 1978, with the return of Paulo Freire and his work with the municipal department of education in São Paulo, the teaching-learning process began to strengthen the idea of interdisciplinary practices (Lopes; Pontuschka, 2009).

In Geography, as a curricular component, there are fieldwork activities to bring students closer to the reality of neighborhoods and communities through the study of the environment. This pedagogical proposal of access to reality and to the experiences lived by the students is part of the relationship with the intelligent dialogue and the reading of the world presented by Paulo Freire. For Lopes and Pontuschka (2009, p. 174):

> This pedagogical activity is materialized by immersion oriented towards the complexity of a given geographical space, the establishment of an intelligent dialogue with the world, with the aim of verifying and producing new knowledge [...] The Study of the Environment can make the teaching-learning process more meaningful and provide the actors with the development of a critical and investigative look at the apparent naturalness of social life.

From the objectivity of the theoretical proposal, the applications of educational practices are possible, through the possibilities of acting not only in the acquisition of knowledge by the students, but also in the improvements of the social well-being of the community in which it is inserted.

THE EDUCATIONAL PRACTICES IN THE NATURAL SCIENCES OF SECONDARY AND TECHNICAL EDUCATION

Regarding the relationship between experimental practices and science teaching, the National Curriculum Parameters for High School (MINISTÉRIO DA

ISBN: 2526-4052 | Volume 8 | Nº 17 | Ano: 2024 – DOI: 10.61389/rbecl.v8i17.8985

EDUCAÇÃO, 2019) consider the following as Natural Sciences: Biology, Physics and Chemistry. Chemistry is the discipline that comes closest to this text, as it presents laboratory practices more frequently, as it studies the transformations of matter.

Among the structuring themes of the teaching of Chemistry are: Chemistry and the atmosphere, Chemistry and the lithosphere, Chemistry and the hydrosphere. In this sense, the teaching of Chemistry is related to the importance of considering chemical transformations in nature, being present the relationship with Geography, including the relations with Biology through the theme: Chemistry and the biosphere.

Chassot (2003) considers that language has limitations regarding the understanding of natural phenomena, but it is through science that we lead ourselves to improve the quality of life, this author states: "understanding science makes it easier for us to contribute to control and predict the transformations that occur in nature. Thus, we are able to propose these transformations, so that they lead to a better quality of life" (CASSOT, 2003, p. 91). This control of events that occur in nature only happens on a local scale, that is, measures to recover degraded areas, for example, because natural events on a regional and especially global scale are not controlled by humanity.

For Chassot (2003), there is a difference between academic knowledge and school knowledge, since academic knowledge occurs for teacher training and involves scientific knowledge with the resources available in universities, but this teacher needs to transpose this knowledge to knowledge at the school level and adapt his methodologies to the didactics necessary for student learning. However, the student can already have contact at school with the methodologies used in universities, if the schools have resources available for laboratory experimentation activities. Lima (2012, p. 99) states: "the steps of the teaching processes are the same as those of the research processes, namely: determination of the problem, data collection, formulation of hypotheses, experimentation involving students and teachers, configuration or rejection of the hypotheses formulated".

ISBN: 2526-4052 | Volume 8 | Nº 17 | Ano: 2024 – DOI: 10.61389/rbecl.v8i17.8985

Regarding methodologies in the classroom, Salesse (2012) considers the importance of searching for new ideas based on the results of experiments:

> [...] experiments carried out by the student himself seeking the confirmation of information already acquired in theoretical classes, whose interpretation leads to the elaboration of concepts, being important in the formation of links between spontaneous conceptions and scientific concepts, providing students with opportunities to confirm their ideas or restructure them (Salesse, 2012, p. 11).

Seeking the philosophical proposal of Bacon (1979), based on the proposition of "fruitful" experiments, the teacher needs to favor the critical sense of the students in the application of experiments to seek in creativity the creation of new experiments to interpret nature. Salesse (2012) affirms the importance of the didactic potential of experiments:

> A methodology should not be based on experimental classes of the 'cake recipe' type, in which learners are given a script to follow and must obtain the results that the teacher expects, wanting knowledge to be built by mere observation [...] The didactic potential of an experiment is more precisely related to the various possibilities of exploring concepts to which its interpretation can lead us (Salesse, 2012, p. 17).

The teaching of Natural Sciences, with a focus on Chemistry and the contributions of the other sciences, needs to have experimental practical classes. The educator, in the search for adaptations of methodologies according to the availability of resources in public schools, ensures the necessary creativity for the assimilation of theoretical knowledge and revision of this knowledge through practical results.

RESULTS OF FACT

The didactic practices are fundamental to the Natural Sciences and the example of experiments in laboratories is important in the teaching of Chemistry. In this educational context, schools need spaces to create laboratories and school

ISBN: 2526-4052 | Volume 8 | Nº 17 | Ano: 2024 – DOI: 10.61389/rbecl.v8i17.8985

management needs to guarantee resources to support educators in the application of experimental methodologies. The result of this effort guarantees the student's learning in the face of practices and relationships with theoretical knowledge.

In the technical schools Centro Paula Souza in the State of São Paulo there are courses of technician in Chemistry, for which this text presents an example of the realization of Chemistry.

The demonstrations of the experiments aimed at the intention of "exceptional", that is, through the demonstrations to provoke, through the observation of the students, the questioning of the chemical reactions occurring in the form presented.

In addition to the use of appropriate substances to produce the chemical reactions, models were developed to adapt the reactions through creativity and seek a relationship with the areas of knowledge, such as the "volcano" experiment associated with geographical knowledge in a model. Figure 1 shows the application of the experiment in the Chemistry laboratory of the state technical school.

Figure 1: Model of volcano in Chemistry class

Source: Class photo (2019)

ISBN: 2526-4052 | Volume 8 | Nº 17 | Ano: 2024 – DOI: 10.61389/rbecl.v8i17.8985

In short, experiments are important methodologies in the educational practice of Natural Sciences and the initiative of educators to develop samples or fairs to disseminate these practices to the community is of great contribution to school knowledge.

Educational practices to awaken environmental awareness are one of the applications of Dewey's pedagogical proposal. The act of acting through practice with the intention of improving the living conditions of the community is one of the ways in which Dewey's proposal is applied.

For Dewey (2007, p. 17): "consciousness is to signify, to do something and to perceive the meaning of things in the light of that intention". Therefore, awareness is in the perception of problems and obstacles and in the intentions of how we can act to overcome them.

The knowledge of each region or hydrographic basin through fieldwork brings the student closer to the problems of environmental degradation and scientific knowledge can contribute to proposals for the recovery of degraded areas (Guimarães, 1999).

Environmental awareness is one of the main trends in contemporary education and is directly related to Dewey's pedagogy of practices in action as a possibility of improving environmental conditions.

FINAL CONSIDERATIONS

The Education presents many challenges facing each school unit and how each school inserted in a neighborhood or community can contribute to the improvement of social well-being. The actor of education cannot be restricted to a definitive objective outlined by a group external to the school reality, and the democratic process and social discussions are necessary to elaborate an adequate planning for each school.

ISBN: 2526-4052 | Volume 8 | Nº 17 | Ano: 2024 – DOI: 10.61389/rbecl.v8i17.8985

Educational methods need to seek a balance of interests of the educator and the learner in order to consider in the educational process the means of adapting the contents to the problems experienced by the learner. The study of the environment is one of the methodologies to be applied for the contact of the student with the reality of the community where the school is located. A fieldwork or an excursion can arouse the interest of the student in a theme, whose student can in the future become an active professional in the face of environmental and social problems and present concrete solutions by being close to this reality.

Despite the scarcity of financial resources made available to public educational institutions, creativity can promote the use of low-cost materials to produce educational activities and ensure the necessary didactics for the acquisition of experiences.

Advances in scientific knowledge were due to the initiative to apply experiments to interpret the results that occur in nature. Experimentation is an important methodological proposal in the field of Natural Sciences and students can have access to the methodologies since elementary school, with subsequent concentration of activities in high school to associate theory and practice.

Despite the difficulties in the availability of material resources in public schools, teachers and school management need to join joint efforts with students in educational practices to materialize laboratory experiments and generate knowledge from practical results.

The results of the investigations based on the experiences lived in the group depend on the planning, whose educators have a fundamental role in the orientation of the educational and practical projects. The adequate orientation of projects by methodological rigor is one of the hallmarks of Dewey's instrumentalism that is applied in the contemporary context, whose research needs to be directed by the appropriate method for each theme. Methodological rigor cannot be evaluative in the sense of punishment, but guiding a method, a right path is necessary for the success of the research.

ISBN: 2526-4052 | Volume 8 | Nº 17 | Ano: 2024 – DOI: 10.61389/rbecl.v8i17.8985

The result achieved that contradicts a hypothesis cannot be seen as an error, but rather as a possibility to rethink in the face of problems and how experiences can generate knowledge that contradicts theories previously accepted as absolute truths. Scientific knowledge itself is breaking with standardizations and seeking to consider reality due to its complexity and possibilities for solving environmental and social problems. Initiatives and attempts to apply the methodologies are necessary for both the researcher and the student, since educational knowledge can be produced with small actions.

The small educational actions with the use of laboratories, the samples of the research carried out in public schools, the murals to present the results of the research and the field classes in forest gardens are examples of how education can change the world. Small actions can lead to big ideas.

REFERENCES

ARISTÓTELES. **Metafísica**. São Paulo: Loyola, 2002, tradução de Giovanni Reale.

BACON, F. **Novum Organum**: ou verdadeiras indicações acerca da interpretação da natureza. 2.ed. São Paulo: Abril Cultural, 1979, tradução de José Aluysio Reis de Andrade.

BACON, R. A ciência experimental. In: BACON, R. **Obras escolhidas**. Porto Alegre: Editora Universitária São Francisco, Pensamento Franciscano, v.8, p.93-157, 2006b, tradução de Jan G. ter Reegen.

CHASSOT, A. Alfabetização científica: uma possibilidade para a inclusão social. **Revista Brasileira de Educação**, n. 22, p. 89-100, 2003.

CHAUÍ, M. S. **Convite à filosofia**. São Paulo: Ática, 2000.

CONTRERAS-DOMINGO, J.; LARA, N. P. **La experiencia y la investigación educativa**. Madrid: Morata, 2010.

DEWEY, J. **Democracia e educação**: capítulos essenciais. São Paulo: Ática, 2007.

ISBN: 2526-4052 | Volume 8 | Nº 17 | Ano: 2024 – DOI: 10.61389/rbecl.v8i17.8985

GUIMARÃES, E. M. A. **Trabalhos de campo em bacias hidrográficas**: os caminhos de uma experiência em Educação Ambiental. Dissertação (Mestrado em Geografia), Universidade Estadual de Campinas, 1999, 184f.

HUME, D. **Um tratado da natureza humana**. São Paulo: Paraula, 1995, tradução de Rachel Gutierrez e José Sotero Caio.

LIMA, J. O. G. Perspectivas de novas metodologias no ensino da Química. **Espaço Acadêmico**, n. 136, p. 95-101, 2012.

LOPES, C. S.; PONTUSCHKA, N. N. Estudo do meio: teoria e prática. **Geografia**, Londrina, v. 18, n.2, p. 173-191, 2009.

MBISIKE, R. C.; AKHIMIEN, P. E.; ONIHEN, P.J.; BURAIMOH, O. O. **Trends in semantics and pragmatics**. Lagos: Lagos State University Press, 2020.

MINISTÉRIO DA EDUCAÇÃO. **Parâmetros Curriculares Nacionais do Ensino Médio**: Ciências da Natureza, Matemática e suas Tecnologias. Disponível em: <http: //portal.mec.gov.br/seb/arquivos/pdf/CienciasNatureza.pdf> Acesso em: 19 mar. 2019.

REDDEN, J. D.; RYAN, F. A. **Filosofia da Educação**. 5.ed. Rio de Janeiro: Livraria Agir Editora, 1973, tradução de Nair Fortes Abu-Merhy.

RUIZ, G. La teoría de la experiencia de John Dewey: significación histórica y vigencia en el debate teórico contemporáneo. **Foro de Educación**. n.15, v.11, p. 103-124, 2013.

SALESSE, A. M. T. **A experimentação do ensino de Química**: importância das aulas práticas no processo de ensino-aprendizagem. Trabalho de Conclusão (Especialização em Educação), Universidade Tecnológica Federal do Paraná, 2012, 62f.

TOMÁS DE AQUINO. **Súmula contra os gentios**. Rio de Janeiro: Abril Cultural, Os pensadores, v.8, 1973, tradução de Luiz João Baraúna.

WHITEHEAD, A. N. **O conceito de natureza**. São Paulo: Martins Fontes, 1994, tradução de Júlio B. Fischer.

Data da submissão: 24/09/2024
Data do aceite: 15/10/2024