# Editorial

We are happy to present *Sophia volume* 37, which offers a set of philosophical reflections with aspects interrelated between physics, metaphysics and education.

This publication, rather than providing answers to the various problems that arise around the proposed theme, seeks to set new questions, leaves tasks for future research and invites us to rethink various questions: how can we understand and make sense, from various philosophical currents, to theories of physics such as quantum mechanics or relativity theory? How does metaphysics, in the present 21st century, address fundamental questions about reality, being and existence, in the context of current scientific, technological and educational advances? How has the understanding of physics evolved over time and what have been its main contributions to science, technology and education? What are the main approaches of philosophers who have interpreted and contributed to the development of theology, theories of physics and their contributions to the understanding of scientific practice, reality and education? What are the main philosophical and epistemological assumptions of theories in contemporary physics that guide research and current science? How has relativity theory transformed our conceptions of time and space? What are the implications of Newton's classical mechanics formulated in the 17th century? What are the implications of Einstein's special and general theory of relativity on the understanding of current reality? What didactic strategies, methods, techniques and instruments can be considered effective in the teaching-learning process of the contents of physics? What is the theoretical-practical articulation existing between physics, metaphysics and education? What mechanisms and pedagogical approaches are proposed to integrate the conceptual and practical understanding of physics, metaphysics and education in the current context? What are the advantages, limitations, perspectives and challenges of string theory or quantum gravity, of the special and general theory of relativity, of quantum mechanics (early 20th century), of Clerk Maxwell's electromagnetic theory (developed in the 19th century), of quantum field theory understood as an extension of quantum mechanics, etc.?



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## Articulation between physics, metaphysics and education

Based on the criterion that the articulation between physics, metaphysics and education strengthens the understanding of the world, promotes the intellectual development of the human being and contributes to the preparation of the subject to face the new socio-political, ethical-historical and techno-scientific requirements, from the perspective of the editor, some general brushstrokes that allow understanding the existing link between physics, metaphysics and education are considered. Here are the optics of a possible approach:

1. *Ontological optics*, both physics and metaphysics, concentrate their attention on fundamental questions about the very nature of reality, its being, essence, existence and meaning. Physics seeks to explain reality from the observable laws and phenomena of the universe and metaphysics proposes an explanation from the deepest and most categorical aspects, seeking the first causes and fundamental principles such as: finding the origin of time, space, causation and the very existence of the universe. The integration of these approaches in education will allow students to develop their analytical, critical and comprehensive skills about themselves, others and reality as a whole.

2. *Interdisciplinary optics*, in that the integration of the contents of physics with metaphysics in education promotes a holistic understanding of the world; helps to understand that the human being is immersed in a complex and dynamic system in which everything requires everything; understands the dynamics of the universe and fully understands that observable physical laws interact with philosophical questions about the surrounding environment, time and space: "We experience an era like a network of systems, functions and interrelated processes in which man is an integral part" (Aguilar, 2020b, p. 336). From this perspective, interdisciplinarity fosters an integral education that, in addition to scientific knowledge, considers the meaning and practical application in life.

3. *Ethical-social-epistemological optics* are linked to interdisciplinarity, since both physics and metaphysics are transversalized by fundamental ethical, social and epistemological issues, so that technologies derived from physics, for example, raise questions about their impact on society and nature, while metaphysical reflections can influence *the understanding of morality and ethics of this type of action.* At the epistemological level it can address questions of existence, knowledge and morality. By integrating this knowledge into the educational field, it prepares



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students to reflect on the purpose and meaning of science and its impact on society to be able to face in an analytical, reflective and informed way the ethical-social challenges and challenges of the current era, to be able to build their own categorical *corpus* on knowledge, the ways of acquiring knowledge and the fundamental values of each of the historical-social practices, for which it is necessary to "rethink the mechanisms of democratization, dissemination and socialization of information and new knowledge to guarantee the access of human beings to the various products, uses and services" (Aguilar, 2020a, p. 33).

4. *Optics of the development of philosophical critical thinking*, since students can develop critical thinking skills when exploring the relationship between physics and metaphysics by questioning essential aspects about the nature of the universe and experiences in it. The teaching-learning of physics and metaphysics promotes the development of critical thinking and the ability to question assumptions, propose alternative solutions and new approaches to apprehension of reality. The understanding of observable and measurable aspects of the world (physics) and the underlying categorical and philosophical aspects (metaphysics) contribute to the integral formation of the human being, and allow to enrich the teaching-learning processes with a philosophical dimension helping to understand the foundations and implications of everything to discover, know-how. This articulation inspires curiosity and fosters the capacity for wondering what motivates us to continue searching for answers to the different questions about the universe and about ourselves.



5. *Pedagogical optics*, insofar as the integration of metaphysics with physics allows enriching the curriculum and educational experience, by introducing philosophical and critical debates that may not be evidenced in the purely scientific approach. Likewise, incorporating metaphysics into science education can train students who master concepts of physics and who are prepared to consider the broader implications of that knowledge in their practical lives and in society.

The articulation between physics, metaphysics and education, from the pedagogical level, contributes to the improvement of teaching-learning, strengthening a broad framework to understand science and impact with the understanding of the world and the human being. While physics provides the empirical knowledge and tools to understand the physical world, metaphysics offers a broader philosophical perspective that can complement and enrich science education, providing additional contexts and reflections on knowledge of the ultimate nature of reality and on life itself.



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The pedagogical relationship between physics, metaphysics and education offers an enriching and holistic perspective in the academic and personal training of students. However, this integration at the pedagogical level, in the curriculum, has its advantages, limitations and challenges, which must be faced due to the different nature of the approaches and methodologies of each one. The implementation of this articulation requires professionals well versed in the three fields of knowledge: physics, metaphysics and education, which requires additional training and a globalizing interdisciplinary approach that considers all divergent criteria, interpretations and approaches.

6. *Gnoseological optics*, insofar as metaphysics invites to reflect on the possibility, origin, form, essence, truth and limits of scientific knowledge and the implications of current theories of physics, which leads to understanding the construction of science as a human construction subject to permanent review and certain expansion.



Metaphysics addresses deeper questions about the nature of matter, space, time, and causation, exploring concepts that go beyond the physically measurable, so that, while metaphysics deals with questions about the nature of reality and the human being about existence and the fundamental principles that underlie physics and other sciences, physics focuses on observable and quantifiable phenomena, offering an empirical understanding of the material world underpinned by observations and experimentations.

To the extent that both metaphysics and physics respond to fundamentals, metaphysics from the rational and categorical level, and physics as a natural science that studies the fundamental laws of the universe; in pedagogical practice complications and/or confusion may occur. The diversity of conceptions about the meaning and purpose of metaphysics and physics can affect the way of understanding pedagogical conceptions and can even affect the purpose of education, the nature of knowledge and the purpose of ethics. The logical laws of metaphysics and the laws of physics can have an impact on how science is taught and understood in education. Moreover, contemporary physical theories often raise philosophical questions about reality and the limits of knowledge.

In summary, to understand the articulation between physics, metaphysics and education, it is necessary to recognize that these fields of knowledge are connected to each other to provide a more complete framework and promote critical-analytical, propositional and ethical reflection, supported by the experiences of the context and the situation.



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## To-do tasks for educational work

From the latter, some pending tasks are foreseen to achieve an adequate articulation between these areas of knowledge:

- To create curricular programs that integrate fundamental concepts of physics and metaphysics located and contextualized.
- To design of texts, guides, digital resources and teaching materials that address the two fields of knowledge (physics and metaphysics).
- To promote an interdisciplinary training in the two areas of knowledge aimed at educators with conviction and vocation.
- To propose professional development events that integrate physics and metaphysics in education through the organization and execution of seminars, workshops, continuous training courses, diplomas, specializations, etc.
- To promote spaces for reflection, research and publication, taking as a starting point the resolution of problems, case studies and others that allow to determine advantages, limitations and/or the effectiveness of the integration of this knowledge in different educational contexts.
- To develop innovative pedagogical approaches that facilitate the integrated teaching of physical and metaphysical concepts.
- To develop methods, techniques and teaching-learning strategies to contribute to the integral formation of the human being. It is necessary to promote theoretical and practical tools that allow "to problematize, choose and decide, evaluate, correct and project the very existence of the subject […] from an analytical, reflective and propositional perspective" (Aguilar, 2019, p. 113).
- To create methods, techniques and assessment tools that allow to determine the understanding and impact of the integration of this knowledge in the learning of students.
- To establish interdepartmental and interdisciplinary networks and collaborations between careers, schools, departments or areas of knowledge linked to physics, philosophy and education. There should be "learning communities and research networks which are inter, trans and multidisciplinary that would respond to the cultural and social diversity of the subjects" (Aguilar, 2019, p. 113).
- To organize conferences, symposiums, working tables and other similar meetings that bring together experts from the three fields



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to reflect, share knowledge, experiences and best practices, to propose new approaches and/or models to be implemented.
- To execute relevant and accessible cultural, curricular and contextual adaptations for students of diverse contexts, ensuring the integration of metaphysical and physical knowledge into unique, local and specific student realities.
- To develop and use educational technologies, *online* platforms, tools and digital resources to facilitate the teaching-learning of physics and metaphysics in an integrated and context-sensitive way.
- To generate mechanisms to evaluate, give feedback, adjust and permanently improve the impact of the integration of physics and metaphysics in education.



## Structure of Sophia's number 37

This volume is made up of ten articles that have passed through all the filters of preliminary review, preselection, evaluation and approval. The first five documents are attached to the central theme of the call and the other five articles belong to the miscellaneous section of the journal. Below is a brief systematization of the content, approach or proposal of each of them.

The central theme opens the route of reflection with the manuscript "Rigor and objectivity as foundations of the rationality of physics in Evandro Agazzi", by Linda Marcela Rivera Guerrero, Arjuna Gabriel Castellanos Muñoz and Carlos Andrés Gómez Rodas, from Colombia. The authors propose to make an approach to the understanding of Agazzi's thought, for which they address some essential aspects of his epistemology applied in the specific field of physics. They consider that two opposing epistemological attitudes predominate in relation to the empirical sciences: as an essential tool for the advancement of knowledge and as a doubt about the metaphysical and epistemological bases of trust in scientific knowledge, an aspect that has led to skepticism and pragmatism of science.

In the same direction, the document "Realism, General Relativity and Schrödinger's Cat", written by Ricardo Restrepo Echavarría, attached to the Technical University of Manabí in Ecuador and the University of Melbourne in Australia. The author examines the nature of reality within the framework of modern physics, including the possibility of freedom. A reform to the metaphysics of realism is proposed, considering that for re-



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alism the world is as it is, independent of the mind. Moreover, it states that "the Copenhagen interpretation estimates that quantum states are in an overlap that only materializes at the moment of observation: Schrödinger's cat is alive and dead, until we observe it." He argues that modern physics, deterministic or indeterministic, also threatens the possibility that we have freedom; in this sense, the researcher analyzes and develops the compatibility of freedom as self-government with modern physics.

The article "Analogy among electrical potential difference and gravitational potential difference on the teaching of physics" written by Raira Maria Lima Bahia and Pedro Javier Gómez Jaime, from Brazil, continues the calibration process. The authors propose to create a strategy that allows a solid learning of the topic of electric potential, through an analogy between electric and gravitational potentials. The proposed activity conceives the use of low-cost materials with the aim of bringing physical knowledge closer to the daily life of students. The researchers conclude that the teaching of physics through analogies elaborated by the teachers of this subject allows a better learning of this science to the extent that scientific and everyday knowledge are linked.



The debate continues with the manuscript "The problem of the knowledge of the thinking substance in the Meditations and in the Objections and Replies of Rene Descartes", by Vinícius França Freitas and Ana Cláudia Teodoro Sousa, from Brazil. In this article the authors develop the hypothesis that the knowledge of the thinking substance in the *Meditations on the first philosophy* and in *Objections and Answers* has not been explained clearly by René Descartes, a necessary question for understanding the status of Cartesian philosophy when writing the *Meditations* to assimilate the knowledge of the thinking substance in the years 1641 and 1642. The researchers conclude that, in *Meditations*, Descartes faces a gap between the ontology of the substance and its knowledge.

This section closes with the article "Phenomenology of audiovisual narrative for an ethical formation employing "anime", presented by Víctor Francisco Casallo Mesías, from Peru. The author presents a phenomenological proposal to work dialogically in the classroom the problematization of an ethics focused on duty, as it is staged in two Japanese animation products ("anime"). Firstly, it discusses phenomenologically how to understand the formative potential of the experience of watching an animated narrative and, secondly, it argues how the phenomenological reinterpretation of the categorical imperative can overcome its disconnection from the affective dimension of the ethical subject and its factual contexts of action to focus on the care of the human condition of vulnerability. Al-



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though the topic does not seem to relate directly to metaphysics or physics in traditional terms, indirect or tangential connections could exist at the metaphysical level, depending on the approach of phenomenological analysis. It could be explored how the narratives of the "anime" address topics such as the nature of reality, personal identity or the relationship between mind and body; at the physics level, some narratives of the "anime" incorporate scientific or speculative topics that could be related to physical concepts such as quantum theory.

On the other hand, in the Miscellaneous section, there are topics of philosophical and educational interest reflected in the different articles presented below.

First, there is the manuscript "Philosophical foundations for a pedagogy of culture" by Gustavo Adolfo Esparza Urzúa, from Mexico. The writer makes a pedagogical reading of Ernest Cassirer's philosophy of symbolic forms, focusing on the phenomenology of knowledge, where it is detailed that the foundations adduced by Paul Natorp, in *Introduction to Psychology* constitute a critical view of psychology as the foundation of intellectual operations. The author proposes to demonstrate that the recovery of the natorphic vision allows Cassirer to argue that all cultural activity has as its foundation in the psychological activities of the subject; it shows that a theory of formation is necessary to explain how the cultural environment conforms the intellectual activities of the subject, a general thesis assumed by Cassirer for the development of his theory of the symbol; finally, it states that the cultural formative agents considered by Natorp for the formation of the individual constitute the theoretical bases of culture in which the student develops his theory of language, myth/religion, art and science as cultural formations.



The discussion continues in the article "Philosophy as a continuation through the educational task", written by Jorge Alarcón Leiva from Chile. The author refers to the current state of the philosophy of education, and seeks to understand the nature and fundamentals of education to improve its effectiveness and identifies a significant gap between the theoretical and practical problems of education, as perceived and responded to in the public agenda. In this sense, it is proposed to explore how to integrate philosophical theory and educational practice, and for this purpose it analyzes Wittgenstein's point of view, enriched with the perspectives of Williams and Medina. It also notes the current state of philosophical research in education with a view to moving towards a more comprehensive and practical approach in the philosophy of education.



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The manuscript "Character Education Grounded in the Values and Norms of Indonesia's Philosophical System," developed by Yulius Rustan Effendi, from Indonesia, aims to demonstrate how students' attitudes and behaviors are shaped by the norms and values of Pancasila, a philosophical system typical of the Indonesian world. An integral understanding of the philosophy of the Pancasila involves breaking down the data into its constituent parts, i.e. the ontological, epistemological, and axiological dimensions of philosophy. The interpretative approach used by the author allows the recording of transformation in character education, with a particular focus on fostering the sense of nationality in students.

The discussion continues with the article "Development of socio-emotional skills in the training of educators in today's society", by Antonio Calderón, from Chile. The researcher intends to reflect on the socio-emotional skills of future education professionals, exploring their influence on teaching and their contribution to society. It seeks to present the role of socio-emotional education in the university curricular activities of teacher trainers in Chile, in that sense, it underlines the urgency of integrating socio-emotional education into the training curriculum of professionals of university education and highlights the coincidence between Goleman, Bisquerra and Morin as the theorists who have deepened the subject.



To conclude with the reflection, we present the article "Learning processes and repercussions from handicrafts for social and popular education" by Fanny Monserrate Tubay Zambrano and Alex Darío Estrada García, from Ecuador. The authors analyze the experiences of a group of artisans from the perspective of Paulo Freire's social and popular pedagogy. They argue that the recognition of artisanal methods and procedures can be used as powerful formative elements to strengthen identity, democratic participation, dialog of knowledge, social justice and intercultural education, when taken seriously by academia, especially in educational science careers. Teaching and learning a trade are pedagogical works framed in the Freirian principles of the pedagogy of liberation and whose experiences can enrich academic pedagogy.

To conclude, it is necessary to emphasize the importance of the topic for current society; hence, are invited to actively engage in the discussion and critical reflection on the topics presented in this volume, in order to reformulate, reframe, explore and/or implement the ideas or aspects that are considered relevant and/or functional to the context and to the subjects.

We are thankful to all those who made possible this new volume. Thank you all for being part of this project.



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Enjoy reading and for those who are immersed in the field of education and the philosophy of education, remember what William Butler Yeats said: "Education is not filling a bucket, but lighting a fire", an aspect we want to happen with each of the lines and ideas expressed in this publication.

Floralba del Rocío Aguilar Gordón
Editor

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