

Adaptive Synergistic Paradigm in the Context of Medical and Life Education Sciences

María Aurelia Lazo-Pérez^{1*}

<https://orcid.org/0000-0002-8291-6949>

Miday Columbié-Pileta²

<http://orcid.org/0000-0003-3812-4239>

Lina Jaqueline Castillo-Plasencia³

Alejandra María Loranca-Melgar⁴

<https://orcid.org/0009-0009-8255-1802>

Jorge Mariano Barrios-Escobar⁵

<https://orcid.org/0009-0003-7203-6459>

Julio Alberto-Castillo⁶

<https://orcid.org/0000-0002-8328-5982>

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Correspondencia

*marialazoperez1965@gmail.com

ABSTRACT

Introduction: Within the framework of the Medical and Life Education Sciences carried out at the faculty of the same name at the Da Vinci University of Guatemala, a new paradigm is required—one that adapts to the current context. **Objective:** To justify the creation of a new paradigm for the Medical and Life Education Sciences that reflects a clear distinction from existing paradigms. **Method:** Theoretical-level methods were used, along with a review of various databases, directories, and academic search engines focused on theoretical references related to existing paradigms. Regularities and differences were identified, which enabled the definition of the new paradigm. **Results:** The Adaptive Synergistic Paradigm emerges from an integrative and dynamic epistemological foundation, articulating adaptive learning, collaborative multidisciplinary, social ethics, and responsible technology to address contemporary complexity in these sciences. It is more open to innovation, technological development, and science compared to traditional paradigms. This openness integrates adaptability, multidisciplinary co-creation, and systemic dynamics, promoting the continuous incorporation of new technologies and scientific approaches in a flexible and evolutionary process. **Conclusions:** The new paradigm overcomes the limitations of previous paradigms through a systemic, collaborative, ethical, and dynamic approach. It aligns with the current epistemological foundations of the Medical and Life Education Sciences by promoting comprehensive, flexible training focused on the real complexity of the contemporary world and global challenges.

Keywords: Paradigms; Synergy; Adaptive; Medical Education; Life Sciences; Medical Education Sciences

¹Licenciada en Educación en la especialidad de Química. Máster en Educación Avanzada. Doctora en Ciencias Pedagógicas. Universidad Señor de Sipán. Perú. Correo electrónico: marialazoperez1965@gmail.com

²Doctora en Medicina. Especialista en Bioestadística. Máster en Atención Primaria de Salud. Doctora en Ciencias de la Educación Médica. Universidad Da Vinci de Guatemala. Facultad de Ciencias Médicas y de la Vida. Ciudad de Guatemala. Guatemala. Correo electrónico: mpileta@udv.edu.gt

³Doctora en Medicina. Especialista de primer y segundo Grado en Pediatría. Doctorante del programa de formación doctoral en Ciencias de la Educación Médica y de la Vida. Universidad Da Vinci de Guatemala. Facultad de Ciencias Médicas y de la Vida. Bostwana. Correo electrónico: lina.jaqueline1627@gmail.com

⁴Licenciatura en Estomatología. Magister Artium en Rehabilitación Oral y Odontología Cosmética. Doctorante del programa de formación doctoral en Ciencias de la Educación Médica y de la Vida. Universidad Da Vinci de Guatemala. Facultad de Ciencias Médicas y de la Vida. Universidad Mariano Gálvez de Guatemala. Ciudad de Guatemala. Guatemala. Correo electrónico: loranca19498@ygmail.com

⁵Ingeniero Agrónomo. Máster en Innovación y docencia superior. Doctorante del programa de formación doctoral en Ciencias de la Educación Médica y de la Vida Universidad Da Vinci. Facultad de Ciencias Médicas y de la Vida. Quetzaltenango. Guatemala. Correo electrónico: jmescoabar@udv.edu.gt

⁶Ingeniero Forestal. Maestro en ciencias en Docencia superior con orientación en andragogía. Doctorante del programa de formación doctoral en Ciencias de la Educación Médica y de la Vida. Universidad Da Vinci de Guatemala. Facultad de Ciencias Médicas y de la Vida. Huehuetenango. Guatemala. Correo electrónico: jcastillo@udv.edu.gt



Paradigma Sinérgico Adaptativo en el contexto de las Ciencias de la Educación Médica y de la Vida

RESUMEN

Introducción: en el marco de las Ciencias de la Educación Médica y de la Vida que se realiza en la facultad con igual nombre de la Universidad Da Vinci de Guatemala, se requiere de un nuevo paradigma que se adapte al contexto actual. **Objetivo:** fundamentar la creación de un nuevo paradigma para las Ciencias de la Educación Médica y de la Vida que refleje la diferencia con los paradigmas existentes. **Método:** se utilizaron métodos del nivel teórico y una revisión en diferentes bases de datos, directorios, buscadores académicos, de los referentes teóricos en relación a los paradigmas existentes. Se identificaron regularidades y diferencias, lo cual permitió la definir el nuevo paradigma. **Resultados:** el Paradigma Sinérgico Adaptativo emerge de una base epistemológica integradora y dinámica, que articula aprendizaje adaptativo, multidisciplinariedad colaborativa, ética social y tecnología responsable para responder a la complejidad contemporánea en estas ciencias. Es más abierto a la innovación, y al desarrollo tecnológico y la ciencia, comparado con los paradigmas tradicionales existentes. Esta apertura al integrar la adaptabilidad, la co-creación multidisciplinaria y la dinámica sistémica, al favorecer la incorporación continua de nuevas tecnologías y enfoques científicos en un proceso flexible y evolutivo. **Conclusiones:** el nuevo paradigma supera las limitaciones de paradigmas previos mediante un enfoque sistémico, colaborativo, ético y dinámico; se ajusta a las bases epistemológicas actuales de las Ciencias de la Educación Médica y de la Vida, al promover una formación integral, flexible y enfocada en la complejidad real del mundo contemporáneo y los desafíos globales.

Palabras clave: Paradigmas; Sinergia; Adaptativo; Educación Médica; Ciencias de la Vida; Ciencias de la Educación Médica

Paradigme Synergique Adaptatif dans le Contexte des Sciences de l'Éducation Médicale et de la Vie

RÉSUMÉ

Introduction : Dans le cadre des Sciences de l'Éducation Médicale et de la Vie, telles qu'elles sont développées à la faculté du même nom de l'Université Da Vinci du Guatemala, un nouveau paradigme est nécessaire pour s'adapter au contexte actuel. **Objectif :** Fonder la création d'un nouveau paradigme pour les Sciences de l'Éducation Médicale et de la Vie, qui reflète une différence significative par rapport aux paradigmes existants. **Méthode :** Des méthodes théoriques ont été utilisées, ainsi qu'une revue de différentes bases de données, annuaires et moteurs de recherche académiques portant sur les références théoriques liées aux paradigmes existants. Des régularités et des différences ont été identifiées, permettant de définir le nouveau paradigme. **Résultats :** Le Paradigme Synergique Adaptatif émerge d'une base épistémologique intégratrice et dynamique, articulant apprentissage adaptatif, multidisciplinarité collaborative, éthique sociale et technologie responsable pour répondre à la complexité contemporaine dans ces sciences. Il est plus ouvert à l'innovation, au développement technologique et à la science, comparé aux paradigmes traditionnels. Cette ouverture favorise l'intégration de l'adaptabilité, la co-crédation multidisciplinaire et la dynamique systémique, en facilitant l'incorporation continue de nouvelles technologies et approches scientifiques dans un processus flexible et évolutif. **Conclusions :** Le nouveau paradigme dépasse les limites des paradigmes antérieurs grâce à une approche systémique, collaborative, éthique et dynamique. Il s'adapte aux bases épistémologiques actuelles des Sciences de l'Éducation Médicale et de la Vie, en promouvant une formation intégrale, flexible et centrée sur la complexité réelle du monde contemporain et les défis mondiaux.

Mots-clés : Paradigmes ; Synergie ; Adaptatif ; Éducation Médicale ; Sciences de la Vie ; Sciences de l'Éducation Médicale

Paradigma Sinérgico Adaptativo no Contexto das Ciências da Educação Médica e da Vida

RÉSUMÉ

Introdução: No âmbito das Ciências da Educação Médica e da Vida, desenvolvidas na faculdade de mesmo nome da Universidade Da Vinci da Guatemala, é necessário um novo paradigma que se adapte ao contexto atual. **Objetivo:** Fundamentar a criação de um novo paradigma para as Ciências da Educação Médica e da Vida que reflita a diferença em relação aos paradigmas existentes. **Método:** Foram utilizados métodos de nível teórico e realizada uma revisão em diferentes bases de dados, diretórios e buscadores acadêmicos sobre os referenciais teóricos relacionados aos paradigmas existentes. Identificaram-se regularidades e diferenças, o que permitiu definir o novo paradigma. **Resultados:** O Paradigma Sinérgico Adaptativo emerge de uma base epistemológica integradora e dinâmica, que articula aprendizagem adaptativa, multidisciplinaridade colaborativa, ética social e tecnologia responsável para responder à complexidade contemporânea nessas ciências. É mais aberto à inovação, ao desenvolvimento tecnológico e à ciência, em comparação com os paradigmas tradicionais existentes. Essa abertura, ao integrar adaptabilidade, co-criação multidisciplinar e dinâmica sistêmica, favorece a incorporação contínua de novas tecnologias e abordagens científicas em um processo flexível e evolutivo. **Conclusões:** O novo paradigma supera as limitações dos paradigmas anteriores por meio de uma abordagem sistêmica, colaborativa, ética e dinâmica; ajusta-se às bases epistemológicas atuais das Ciências da Educação Médica e da Vida, promovendo uma formação integral, flexível e voltada para a complexidade real do mundo contemporâneo e os desafios globais.

Palavras-chave: Paradigmas; Sinergia; Adaptativo; Educação Médica; Ciências da Vida; Ciências da Educação Médica

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INTRODUCTION

In a world marked by increasing complexity, global interdependence, and the fragility of social-environmental systems, traditional approaches to understanding and addressing major contemporary challenges have proven insufficient. The fragmentation in the treatment of human, animal, and environmental health, together with the crises resulting from climate change and rapid technological development, require a profound rethinking of the paradigms that guide collective action

This article proposes the construction of a new Adaptive Synergistic Paradigm that seeks to overcome the limitations of fragmented and one-dimensional approaches. This is based on the systemic integration of disciplines and sectors, on co-creation between diverse actors and on adaptability to uncertainty and the continuous dynamics of contemporary problems.

In this approach, health is understood as a comprehensive phenomenon that involves not only human beings, but also ecosystems and other living beings with whom we share the planet. Technology is conceived as a tool to democratize access and promote inclusive solutions, while collaborative governance and social justice are essential pillars for ensuring equity and sustainability.

Through qualitative analysis, this article explores the fundamentals, challenges, and opportunities inherent in the construction of this emerging paradigm, with the purpose of contributing to a shared vision that allows to respond effectively to the complexity of today's world and ensure equitable and lasting well-being for all forms of life.

When imagining a system where a pandemic is prevented thanks to the collaboration of biologists, community leaders, technology companies, climate experts, and policy makers, using real-time data and respecting local knowledge and equity, it is understood that technological development would be ethical, inclusive, and contextual, with applications in health, agriculture, conservation, and disaster response, all managed with transparency and citizen participation.

This identified need justifies strongly embracing paradigms that represent philosophical, scientific, and social frameworks that guide understanding and action on the world's problems;(1,2) which faces the fragmentation of the health/disease

approach, the increase in emerging diseases, the pressure of climate change, digital transformation, and the need for equity and sustainability. In light of this, essential characteristics for a new way of thinking and acting are emerging, related to ecological and systemic integration, transdisciplinary co-creation, and global collaborative governance, among others.

In the current global health context, there is an urgent need to construct a new paradigm that can respond to the complex and multidimensional challenges facing humanity. The traditional biomedical model, focused almost exclusively on curing diseases, has proven insufficient in the face of a landscape where problems of diverse nature coexist: from communicable diseases that pose a threat through epidemics and pandemics, to the sustained increase in chronic noncommunicable diseases, which are closely related to lifestyle and social determinants.(3,4)

Added to this are emerging transnational challenges such as antimicrobial resistance, the climate crisis, human displacement, and social inequalities that directly impact the well-being of populations. These phenomena highlight the need to move beyond fragmented views and recognize health as a global common good, whose protection depends on international cooperation and inclusive policies.(3-5)

Likewise, scientific and technological advances, such as artificial intelligence, biotechnology, and telemedicine, raise opportunities to transform healthcare; but they also raise ethical and equity challenges that need to be regulated from a humanistic and sustainable framework. In this sense, the new paradigm must be based on equity, on the recognition of health as a universal human right, and on the integration of social, environmental, and cultural approaches. (3,4)

In short, the authors believe that promoting a comprehensive vision that is not limited to clinical criteria but also incorporates health promotion, disease prevention, ecological sustainability, and the "One Health" perspective, which links human health to animals and the environment, this can only be achieved through a renewed, transdisciplinary, and ethical paradigm, in order to effectively address the challenges of global health in the 21st century.(5)

In this sense, systematization leads researchers to understand the need to recognize a new holistic, collaborative, equitable, and adaptive paradigm,

integrating health, environment, and technology under principles of justice, sustainability, and human rights, capable of managing the complexity and uncertainty of today's world. This paradigm would transcend fragmentation to create solid solutions to the great challenges of the new era. This would be a "Synergistic Adaptive Paradigm," which refers to the sum of efforts, knowledge, and expertise (human, animal, and environmental health, technology, community, governance) working together to achieve holistic, equitable, and sustainable well-being in a complex and changing world.

The adaptive synergistic paradigm has profound resonance in the field of Medical and Life Sciences Education, as it responds directly to the most relevant challenges facing these disciplines today. This is because it integrates disciplinary and transdisciplinary knowledge, addressing traditional segmentation (biomedicine, social sciences, humanities). This paradigm promotes multidisciplinary training programs and teaching teams. It encourages synthesis between basic, clinical, ethical, and social sciences to train professionals capable of addressing the real complexity of health and life. Some of the reasons that make this achievement possible are:

- Learning focused on complex, real-world problems, where the curriculum is geared toward analyzing authentic situations such as pandemics, environmental issues, global health, and social determinants that require systemic thinking, interprofessional collaboration, and adaptive skills. This enriches simulation strategies and community projects. (6,7)
- Curricular and educational adaptability, since the paradigm encourages flexible study plans that evolve according to social needs, scientific and technological innovations. Incorporating skills in response to health crises, environmental emergencies or disruptive advances is key to training professionals prepared for uncertainty. (8–11)
- Ethics, equity, and global citizenship, which focuses on education in universal values, human rights, social justice, and intercultural sensitivity. This promotes a more humanistic view of medicine and life

sciences, adapted to diverse contexts and the challenges of global health. (12–16)

- Innovation and technology as a means, not an end, given because it integrates digital tools, artificial intelligence and technological resources with a critical and ethical sense. The objective is to promote accessible, personalized and collaborative education, but always subordinated to human and environmental needs. (17–19)
- Training for collaboration and intersectoral leadership, expressed in enhancing the development of soft skills and networking, by preparing future professionals to lead and actively participate in diverse teams, crisis management and social and health transformation projects. (20–22)
- Promotes the need to overcome biomedical reductionism and make way for an approach that incorporates social, cultural, ethical and environmental dimensions in continuing health training. (23–27)

In the educational field of medicine and life sciences, the adaptive synergistic paradigm drives a necessary transformation towards more comprehensive, critical, ethical and resilient professionals, with the capacity for global collaboration and effective response to current and future challenges. Below are some examples of the impact if the proposed paradigm is adopted:

- One Health Programs, as many universities today create spaces where doctors, veterinarians, ecologists and epidemiologists learn together about emerging diseases and sustainability. (28,29)
- Multifactorial crisis simulations with scenarios where health, environmental and social emergencies are managed simultaneously, training synergistic and adaptive competencies. (30–32)
- Adaptive continuing education through digital platforms and communities of practice that adjust content according to scientific advances or epidemiological outbreaks, promoting permanent updating. (33–36)

- The research promotes a plural approach, where quantitative, qualitative and mixed methods converge to offer more relevant and contextualized solutions. (37–39)
- In professional practice, interprofessional cooperation is strengthened, by promoting a more inclusive, humanized and sustainable health system, professionals not only competent in the application of health procedures from a technological and clinical perspective, but also sensitive to the social determinants of health and committed to collective well-being.(40,41)

The purpose of this publication is to support the creation of this new paradigm for the Sciences of Medical and Life Education, where, in addition, the difference with existing paradigms is reflected.

METHOD

The Adaptive Synergistic Paradigm was essentially developed using theoretical methods based on systemic, analytical-synthetic, and complexity approaches, which allow knowledge from various disciplines to be integrated and articulated by analyzing the dynamic interrelationship of its components in order to understand complex multidimensional phenomena (3,8). For the document review, internationally recognized academic databases such as PubMed, Scopus, Web of Science, and SciELO were consulted, as well as directories specializing in medical education, health sciences, environmental sciences, and educational technology. Catalogs of indexed scientific journals with recent publications between 2022 and 2025 were accessed, prioritizing peer-reviewed articles addressing topics such as emerging paradigms, medical education and life sciences, adaptive learning, multidisciplinary synergy, and ethical technology in health.

The selection criteria included: (a) publications in Spanish, English, or Portuguese; (b) studies presenting theoretical or empirical evidence linked to integrative, adaptive, and multidisciplinary paradigms in the field of medical education, public health, and related sciences; (c) articles published in journals indexed in the main databases mentioned; (d) texts that explicitly discussed epistemological, methodological, and ethical aspects related to complex educational or health paradigms. On the contrary, the following were excluded: (a) documents that were not rigorous or peer-reviewed, such as position statements or editorials without methodological support; (b)

studies that addressed limited or strictly biomedical paradigms without a systemic or interdisciplinary perspective; (c) publications prior to 2021 in order to keep the analysis up to date; and (d) texts whose thematic relevance was tangential or exclusively technological with no link to education or integrated health

This methodological process ensured a well-founded and rigorous approach to the construction of the new paradigm, basing the epistemological proposal on a solid, up-to-date, and multidisciplinary scientific foundation compatible with the contemporary challenges of medical education and the life sciences.. (42–46)

RESULTS

The Science of Medical and Life Education is a multidisciplinary, synergic, and adaptive field dedicated to researching, developing, and transforming the processes of training, learning, and managing health and biological knowledge in complex, uncertain, and constantly evolving contexts. This science integrates medical, biomedical, environmental, technological, and social knowledge to train professionals capable of addressing health and well-being from a systemic, ethical, and collaborative perspective by fostering educational innovation, curricular adaptation, responsible use of technology, and the promotion of equity, justice, and citizen participation in solving local and global problems.

It is a science in permanent construction because it responds to contemporary social and life demands; moreover, it goes beyond traditional fragmented and static approaches. Its novelty lies in the active integration of multiple knowledge, the incorporation of pedagogical and technological innovations, as well as epistemology oriented towards co-creation, adaptability, and response to emerging challenges such as health crises, ecological changes, and disruptive scientific advances. (47,48) The Science of Medical and Life Education is grounded in the constant updating of its foundations, the reflective evaluation of competencies, and interdisciplinary dialogue; it marks a paradigmatic evolution toward more comprehensive, dynamic, and socially responsible educational models.

This is why the authors of this publication consider the need for a new paradigm that will enrich the epistemic bases of the Medical and Life Education Sciences. **The Adaptive Synergistic Paradigm**

differs from existing paradigms, especially in its integral, dynamic, interprofessional and collaborative approach that overcomes traditional limitations; supported by recent literature (2022-2025) of medical and social sciences, which confirms that it emerges with a systemic, dynamic, co-creative and ethical approach that is not found in the most widely used paradigms. In addition, the current texts on medical education indicate that contemporary education in this field is oriented towards models which integrate different knowledge and disciplines, which promote curricular adaptability, personal and professional skills and take advantage of technology to personalize and democratize learning.

The term "synergistic" already implies the idea of collaboration and interaction between multiple disciplines, knowledge or actors; since synergy is the result of the sum of the integrated parts, which produces an effect greater than that which each one would have separately. Therefore, in the name "Adaptive Synergistic Paradigm", multidisciplinary (or even trans disciplinary and interdisciplinarity) is implicit within the concept of synergy. Therefore, the term "Synergic" already implies multidisciplinary and joint work between areas; while "Adaptive" points out the ability to evolve and respond in complex and changing environments, which is key to the sciences of medical and Life education. That is to say, for the Sciences of Medical Education and Life, the "Adaptive Synergistic Paradigm" is the suggestion that best fits epistemologically to the current trends and needs of the field.

Organization of Knowledge Underpinning the Adaptive Synergistic Paradigm.

1. Epistemological Foundations: Integration and Systematic Complexity

The paradigm is based on the systemic integration of knowledge, it overcomes the traditional fragmentation between biomedical, social and technological disciplines. This approach recognizes health and education as complex and interrelated systems that involve biological, environmental, social and technological factors in dynamic interaction. It is based on the epistemological basis that knowledge must be approached as a multidimensional phenomenon linked to real and changing contexts. (49.50)

2. Adaptability and Adaptive Learning.

A key element is the incorporation of adaptability into educational and knowledge management processes, made possible by adaptive learning systems that tailor content and methods to the individual and collective needs of students and professionals. Adaptability also responds to the dynamics of current challenges, such as pandemics and climate change, requiring curricular flexibility and continuous updating. (33,51)

3. Multidisciplinary and Active Co-creation.

The paradigm includes explicit collaboration between various disciplines and actors, favoring the co-creation of knowledge and comprehensive solutions to complex problems. This process promotes the concurrent management of research, teaching and service, transcending isolated work and favoring synergy between the educational sector, health and 4. Ethics, Social Justice and Participatory Governance.

4. Ethics, Social Justice and Participatory Governance

It incorporates ethical values and principles of social justice at the center of knowledge and practice, aligning with the need for equity, respect for human rights and citizen participation in health and education. Collaborative governance is conceived as essential to face global and territorial challenges in a coordinated and fair manner. (56-59)

5. Technology as a Democratizing Tool

Technology is conceived not only as a technical instrument but as a democratizing and enhancing means of access, inclusion and personalization of learning and health care. Critical, ethical and contextualized use of digital innovations, artificial intelligence and collaborative platforms is encouraged. (60.61)

This organization of knowledge shows how the **Adaptive Synergistic Paradigm** emerges from an integrative and dynamic epistemological basis, which articulates adaptive learning, collaborative multidisciplinary, social ethics, and responsible technology to respond to contemporary complexity in **Medical and Life Sciences Education**.

In detail, this paradigm considers social and educational systems as complex, dynamic and non-linear systems capable of adaptation, learning and constant innovation.(62) Promotes synergistic interaction between different actors and

knowledge, not only to integrate existing knowledge but to generate novel and disruptive combinations that drive innovation.(63) Recognizes technology as a democratizing and ethical tool, key to promoting personalized learning, collaboration and knowledge management, in contrast to models that see it only as a technical or economic instrument.(64.65)

It is also based on collaborative governance models and adaptive networks that allow rapid incorporation and response to scientific and technological advances and changes in the global context, something fundamental in the new global technoeconomic paradigm and its hyperconnected ecosystem.(65) Furthermore, it promotes an organizational and educational culture where innovation arises not only from applied science, but from the synergy between creativity, collaboration and continuous adaptation.(66)

It is important to recognize that unlike previous paradigms that may be more rigid, segmented or limited to certain disciplines, the Adaptive Synergistic Paradigm is permeable and favorable to science, innovation and technological development, as it is designed to evolve in complex and changing environments. maximizing the potential of new ideas and technological tools in medical education, health and life. (62)

DISCUSSION

For the discussion of results when constructing the Adaptive Synergistic Paradigm and its contribution to the epistemological bases of the Sciences of Medical Education and Life, it is essential to structure the analysis in two axes: differences and similarities with existing paradigms, and how this paradigm best adapts to these current epistemological bases.

Differences with existing paradigms

- Unlike classical paradigms (biomedical, positivist, or even some social and technological) that tend to fragment phenomena into isolated parts, the Adaptive Synergistic Paradigm addresses health and education as complex interconnected systems that integrate human, animal, environmental health, technology and society in a joint and dynamic vision.
- Faced with biomedical models focused on individual causes and static diagnoses, the

proposed paradigm incorporates complexity, uncertainty and adaptive processes, with an approach that combines scientific evidence with contextual and subjective interpretations of the patient and the community.

- Previous paradigms tend toward static or linear approaches, while this one emphasizes real-time adaptability in the face of complexity and uncertainty. This is relevant in the face of accelerated technological changes, health emergencies and environmental challenges.
- Although other paradigms have introduced transdisciplinary elements, here synergy implies active and equitable collaboration between multiple actors and knowledge (educational, clinical, technological, social), by overcoming historical fragmentations.
- In contrast to technological paradigms that prioritize efficiency or market, the Adaptive Synergistic Paradigm promotes its ethical, inclusive and people-centered use, fostering empowerment and equity. (67-69)
- This paradigm explicitly incorporates justice and citizen participation as an epistemological basis, something that in traditional models is secondary or absent.

Similarities with existing paradigms

- It maintains the assessment of scientific rigor, although it expands the acceptance of contextual, experiential and local knowledge as valid for educational and health action.
- Similar to post positivism and pragmatism, as it combines quantitative and qualitative approaches to address complex problems with methodological flexibility.
- It continues to develop the foundations of transdisciplinary paradigms, but with a renewed emphasis on co-creation and networking that goes beyond academics.

Adaptation to the epistemological bases of the Sciences of Medical Education and Life.

- The Adaptive Synergistic Paradigm is aligned with the need for medical education that recognizes the biological, social and technological complexity involved in the training of health professionals. Promotes the integration of basic, clinical, ethical and social knowledge.
- It responds to the epistemological demand to prepare future professionals not only in technical knowledge, but also in skills for critical thinking, adaptability, interprofessional interaction and leadership.
- It reinforces the idea that health education must be dynamic, capable of incorporating scientific advances and responding to emerging crises in real time, a central criterion in contemporary epistemologies.
- It explicitly integrates ethical values, human rights and social justice into the core of medical educational knowledge, since it goes beyond the merely technical or functional approach.
- It reflects the emerging epistemology that sees technology as a support for personalized and collaborative learning, with an ethical and socially responsible perspective

The Adaptive Synergistic Paradigm is in tune with contemporary trends in Medical Education and Life Sciences, integrating technological innovation, interdisciplinarity, adaptability and a vision focused on the student and the real complexity of the environment. Recent examples in the scientific literature show that educational programs are moving towards models that promote the training of professionals who not only memorize content, but are capable of navigating the evolution of knowledge, adapting to new realities and health challenges; that incorporate active, constructivist and collaborative learning, with flexible and personalized curricula that consider the individual needs of the student and social contexts. current ecological and technological. (70) (71) (72) (73) (74)

In addition, they are models that use technological innovations such as simulation, digital platforms and mobile devices to practice skills in safe and accessible environments, strengthen deliberate

learning and the acquisition of complex skills; They promote the integration of multidisciplinary knowledge and the co-creation of knowledge, by overcoming the traditional fragmented approach based on isolated disciplines, promoting integrated teaching and research teams; they aim to strengthen education that addresses not only the biological dimension of health, but also the social, environmental and ethical dimension, as well as collaborative governance to solve global and local public health problems.(74.75)

These aspects show how the Adaptive Synergistic Paradigm not only aligns with current needs, but also expands and deepens the innovations and advances described in contemporary medical education; and explains the role of the synergy between technology, ethics, multidisciplinary and adaptability to train more comprehensive, critical professionals capable of facing the complexity of today's world.

CONCLUSIONS

The Adaptive Synergistic Paradigm constitutes a significant epistemological evolution that overcomes the limitations of previous paradigms through a systemic, collaborative, ethical and dynamic approach. This paradigm optimally adjusts to the current epistemological bases of the Sciences of Medical Education and Life, by promoting comprehensive, flexible training focused on the real complexity of the contemporary world and global challenges.

BIBLIOGRAPHICS REFERENCES

1. Aranda VH. Paradigmas epistemológicos y tendencias epistémicas emergentes en la formación investigativa y científica universitaria. Educación Superior [Internet]. diciembre de 2024;11:139-50. Disponible en: http://www.scielo.org.bo/scielo.php?script=sci_arctext&pid=S2518-82832024000300139&nrm=iso
2. Ordoñez-Pacheco ÁF. Metodología de la Investigación Metodología académica con aplicación a las investigaciones sociales: enfoques, tipos, métodos y diseños. SOCIETEC [Internet]. 25 de marzo de 2025 [citado 9 de agosto de 2025];8(2):335-57. Disponible en: <https://institutojubones.edu.ec/ojs/index.php/societec/article/view/484>
3. Lazo-Pérez MA, Paredes Ojeda RV, Almora Lazo JE, Torres Chanamé FA. Transformación

- educativa y rol de las TICs en la formación de tecnólogos médicos [Internet]. 1.a ed. ARCO EDITORES; 2025 [citado 30 de agosto de 2025]. Disponible en: https://96abf9fb-a2b4-4f23-8e8b-68d6bbf54168.usrfiles.com/ugd/96abf9_8e58872_550694271ac4ce895f261156b.pdf
4. Lazo-Pérez MA, Paredes Ojeda RV, Almora Lazo JE, Diaz Ginez TA. La formación profesional de tecnólogos médicos ante los retos de la salud contemporánea [Internet]. 1.a ed. ARCO EDITORES; 2025 [citado 30 de agosto de 2025]. Disponible en: https://96abf9fb-a2b4-4f23-8e8b-68d6bbf54168.usrfiles.com/ugd/96abf9_8354d12_787e143ff93f6d04287fe8504.pdf
5. Lazo-Pérez MA. Enfoque de una sola salud: retos para la formación de los profesionales de la salud: One health approach: challenges for the training of health professionals/ Approche une seule santé: défis pour la formation des professionnels de santé. Revista de Ciencias Médicas y de la Vida [Internet]. 15 de agosto de 2023 [citado 30 de agosto de 2025];1(1-3):e003-e003. Disponible en: <https://editorial.udv.edu.gt/index.php/RCMV/article/view/32>
6. Soriano Guaicha KM, Rosero Lima PE, Guzmán Calderón JA, Nieves Llangue ZJ. Implementación en el aprendizaje basado en proyectos (ABP) en la educación universitaria: impacto en la motivación y el rendimiento de los estudiantes. Revista Social Fronteriza [Internet]. 26 de septiembre de 2024 [citado 30 de agosto de 2025];4(5):e45456-e45456. Disponible en: <https://www.revistasocialfronteriza.com/ojs/index.php/rev/article/view/456>
7. Moreira-Alcivar EF. Aprendizaje basado en retos (ABR) para el fomento del pensamiento creativo y divergente en adolescentes: diseño, implementación y evaluación en contextos escolares del nivel secundario. Revista Científica Zambos [Internet]. 31 de mayo de 2025 [citado 30 de agosto de 2025];4(2):171-84. Disponible en: <https://revistaczambos.utelvtsd.edu.ec/index.php/home/article/view/119>
8. Moncaleano Martinez CJ, Maldonado CE, Parra Navarro SL, Rivas Delgado EO. Neuroplasticidad curricular: un enfoque de aprendizaje en redes. Revista Iberoamericana de Complejidad y Ciencias Económicas [Internet]. 30 de junio de 2025 [citado 30 de agosto de 2025];3(2):85-104. Disponible en: <https://revistas.ulasalle.edu.pe/ricce/article/view/308>
9. Jiménez Torres SE. La Perspectiva Incierta en la Gestión Docente y la Programación Curricular. Revista El Labrador [Internet]. 28 de marzo de 2025 [citado 30 de agosto de 2025];9(01):114-24. Disponible en: <https://revistaellabrador.net/index.php/RevistaELLabrador/article/view/171>
10. Pérez Molina OF, Ortiz Cabrera ÁM, Oña Haro LM, Oña Ilmiquinga ME, Guayaquil Hernández VD. La calidad educativa en la educación superior: Desafíos y oportunidades en la formación universitaria. Ciencia y Educación [Internet]. 18 de marzo de 2025 [citado 30 de agosto de 2025];6(3):181-9. Disponible en: <https://cienciayeducacion.com/index.php/journal/article/view/zenodo.15056807>
11. Saravia Domínguez H, Saavedra Villar P, Felices Vizarreta LM, Campos Espinoza MM, Janampa Urbano JR. La aplicación del diseño curricular por competencias en la Educación Superior: Una revisión sistemática 2019-2023. Comuni@cción [Internet]. enero de 2024 [citado 30 de agosto de 2025];15(1):92-104. Disponible en: http://www.scielo.org.pe/scielo.php?script=sci_abstract&pid=S2219-71682024000100092&lng=es&nrm=iso&tlng=es
12. Marín RE. Propuestas éticas de Santo Tomás de Aquino, Immanuel Kant y Sigmund Freud: equidad y justicia en el siglo XXI. Ceiba [Internet]. 30 de abril de 2024 [citado 30 de agosto de 2025];23-44. Disponible en: <https://revistas.upr.edu/index.php/ceiba/article/view/21385>
13. Carrero JM. Pedagogía en ciudadanía global y coexistencia cívica. una respuesta a los desafíos de convivencia humana mundial. Pedagogy, Culture and Innovation [Internet]. 8 de julio de 2025 [citado 30 de agosto de 2025];2(1). Disponible en: <https://www.mlsjournals.com/Pedagogy-Culture-Innovation/article/view/4157>
14. Morales Carrero JA. Educación en ciudadanía global y derechos humanos. Alternativa para un mundo posible. Telos: Revista de Estudios Interdisciplinarios en Ciencias Sociales [Internet]. 2024 [citado 30 de agosto de 2025];26(1):240-58. Disponible en: <https://dialnet.unirioja.es/servlet/articulo?codigo=9290653>
15. Rucoba del Castillo LR, Perea de Arévalo D, Rios Perez C, Alarcón Ramírez K, Gratelli Tuesta

- BL. Educación para la Ciudadanía Global: Cómo Formar Líderes Sostenibles. Editorial Internacional Alema [Internet]. 18 de enero de 2025 [citado 30 de agosto de 2025]; Disponible en: <https://editorialalema.org/libros/index.php/alema/article/view/44>
16. Jacovkis J, Parcerisa L, Herrera-Urizar G, Folguera S. ¿A quién educan las plataformas digitales? Equidad y ética educativa en un contexto de post pandemia. Education in the Knowledge Society (EKS) [Internet]. 25 de abril de 2024 [citado 30 de agosto de 2025];25:e30444-e30444. Disponible en: <https://revistas.usal.es/tres/index.php/eks/article/view/30444>
17. Bravo Arteaga KL, Flores Velásquez PR, Viscaino Naranjo FA, Bonilla Tenesaca JR. Herramientas Tecnológicas y su integración en la Planificación docente en la asignatura de Educación Cultural y Artística.: Technological Tools and Their integration into teaching Planning in the subject of Cultural and Artistic Education. Revista Científica Multidisciplinar G-nerando [Internet]. 26 de julio de 2025 [citado 30 de agosto de 2025];6(2):ág. 379-397. Disponible en: https://revista.gnerando.org/revista/index.php/R_CMG/article/view/533
18. Merchán Vera PE, Quito Quichimbo MG, Ramirez Ochoa JS, López López LL, Vega Vega MA. Integración de Herramientas Digitales Interactivas para Fomentar el Aprendizaje Autónomo en Estudiantes de Bachillerato: Un Enfoque Innovador desde la Educación Personalizada. Revista Científica de Salud y Desarrollo Humano [Internet]. 23 de mayo de 2025 [citado 30 de agosto de 2025];6(2):675-703. Disponible en: <https://revistavitalia.org/index.php/vitalia/article/view/626>
19. Juárez Ordoñez MA, Honores Marrufo JM. Las herramientas digitales en educación: una revisión narrativa. Horizontes Revista de Investigación en Ciencias de la Educación [Internet]. 21 de enero de 2025 [citado 30 de agosto de 2025];9(36):620-36. Disponible en: <https://revistahorizontes.org/index.php/revistahorizontes/article/view/1897>
20. Álvarez JC. Conductas de funcionarios(as) municipales y efectivas estrategias intersectoriales en el programa familias, Chile. Revista Científica Administrar lo Público [Internet]. 20 de diciembre de 2024 [citado 30 de agosto de 2025];1(1):104-24. Disponible en: <https://revistas.ucr.ac.cr/index.php/ralp/article/view/354>
21. Moran Pizarro DS, Polo Góngora I. Innovación social y colaboración multisectorial: impulsando el bienestar y la participación a través de modelos integrados. Publicaciones e Investigación [Internet]. 9 de diciembre de 2024 [citado 30 de agosto de 2025];18(3). Disponible en: <https://hemeroteca.unad.edu.co/index.php/publicaciones-e-investigacion/index>
22. Delgado Castro CG. Efectividad de la colaboración intersectorial en la gestión sostenible del recurso hídrico: un análisis sistemático. Mikarimin Revista Científica Multidisciplinaria [Internet]. 1 de mayo de 2025 [citado 30 de agosto de 2025];11(2):5-31. Disponible en: <https://revista.uniandes.edu.ec/ojs/index.php/mikarimin/article/view/3495>
23. El estrés enferma: modelo Biopsicosocial del dolor crónico [Internet]. [citado 30 de agosto de 2025]. Disponible en: <https://rua.ua.es/entities/publication/a2b29339-babf-4ca5-96d7-fd863e5e6a14>
24. Bustos Domínguez R. El Cuerpo Poroso: un nuevo concepto para una perspectiva integral en Medicina, Bioética y Salud Pública. Cuadernos médico sociales [Internet]. 2025 [citado 30 de agosto de 2025];65(1):5-12. Disponible en: <https://dialnet.unirioja.es/servlet/articulo?codigo=10114043>
25. Burwiel JP, Maldonado M, Terreno B. Pensar la Producción de Salud desde el Trabajo Social: Intersecciones entre Rol Profesional y la Salud Colectiva. DP [Internet]. 1 de julio de 2024 [citado 30 de agosto de 2025];14(27):12. Disponible en: <https://publicaciones.sociales.uba.ar/index.php/dbatepublico/article/view/9739>
26. Touche RL, Pardo-Montero J. Fisioterapia Bioconductual: Fundamentos Epistemológicos, Modelo de Razonamiento Clínico y Aplicaciones Tecnológicas. Journal of MOVE and Therapeutic Science [Internet]. 30 de julio de 2025 [citado 30 de agosto de 2025];7(1):757-77. Disponible en: <https://publicaciones.lasallecampus.es/index.php/MOVE/article/view/2777>
27. Torres Belma A. Determinantes sociales de la salud y sociología de la salud: importancia de la formación sociosanitaria en las carreras de Medicina. Educación Médica [Internet]. 1 de marzo de 2025 [citado 30 de agosto de 2025]

- 2025];26(2):100966. Disponible en: <https://www.sciencedirect.com/science/article/pii/S1575181324000810>
28. Una sola salud - OPS/OMS | Organización Panamericana de la Salud [Internet]. 2025 [citado 30 de agosto de 2025]. Disponible en: <https://www.paho.org/es/una-sola-salud>
29. Una sola salud [Internet]. [citado 30 de agosto de 2025]. Disponible en: <https://www.who.int/es/news-room/fact-sheets/detail/one-health>
30. Silva AT, Leal LA, Ribeiro MILC, Silva MM da, Hilário JSM, Henriques SH. Simulación clínica para el desarrollo de la comunicación y el trabajo en equipo en enfermería. Rev Latino-Am Enfermagem [Internet]. 2025 [citado 30 de agosto de 2025];33:e4548. Disponible en: <https://www.scielo.br/j/rlae/a/C8TsfHqQchLGsxZXQnbNRBs/?lang=es>
31. Hernández Sánchez E. Evaluación del efecto del entrenamiento en simulación clínica sobre emergencias obstétricas con un grupo multidisciplinar. [Internet] [doctoralThesis]. 2018 [citado 30 de agosto de 2025]. Disponible en: <https://repositorio.ucam.edu/handle/10952/3835>
32. Batista-Barallobre AR. Emergencia social en sistemas adaptativos complejos: una revisión sistemática desde la simulación basada en agentes. Maestro y Sociedad [Internet]. 24 de agosto de 2025 [citado 30 de agosto de 2025];22(3):2232-45. Disponible en: <https://maestroysociedad.uo.edu.cu/index.php/MYS/article/view/7123>
33. Suin Guerrero AR, Guerrero Lucio NI, Merchán Suin RR, Quijije Moran WV. El impacto del aprendizaje automático en la educación personalizada: hacia un aprendizaje adaptativo y eficiente. Revista Científica de Innovación Educativa y Sociedad Actual «ALCON» [Internet]. 19 de octubre de 2024 [citado 30 de agosto de 2025];4(5):83-92. Disponible en: <https://soeici.org/index.php/alcon/article/view/283>
34. Pilamunga Cayambe L, Soria Ramos J, Loaiza Dávila L, Maqueira Caraballo G. Aprendizaje adaptativo en la inclusión a la Educación Física de estudiantes con discapacidad. 593 Digital Publisher CEIT [Internet]. 2025 [citado 30 de agosto de 2025];10(1):827-43. Disponible en: <https://dialnet.unirioja.es/servlet/articulo?codigo=9966678>
35. Jácome Camacho DC, Barahona Castillo M del C, Merchán Cedeño R del P, Velarde Meléndez DE, Velarde Meléndez LR. Plataformas de Aprendizaje Basadas en Inteligencia Artificial para la Educación Inclusiva de Estudiantes con TDH: Una Aproximación al Aprendizaje Adaptativo. Revista Veritas de Difusão Científica [Internet]. 6 de marzo de 2025 [citado 30 de agosto de 2025];6(1):970-89. Disponible en: <https://revistaveritas.org/index.php/veritas/article/view/444>
36. Torres Agurto SA, González Córdova NR, Alvarado Pignataro DF, Sarmiento Merchan MA. Plataformas de Aprendizaje Adaptativo: Aprovechando la IA para una Educación Personalizada. Polo del Conocimiento [Internet]. 22 de febrero de 2025 [citado 30 de agosto de 2025];10(1):2457-70. Disponible en: <https://www.polodelconocimiento.com/ojs/index.php/es/article/view/8994>
37. Lavid-Moncayo SD, Moncayo-Resabala NM, Lavid-Ávila JR, Ávila-Tabares PL. Atención a la diversidad en el sistema educativo ecuatoriano desde un abordaje inclusivo [Attention to diversity in the Ecuadorian education system from an inclusive approach]. Revista Multidisciplinaria Perspectivas Investigativas [Internet]. 20 de marzo de 2025 [citado 30 de agosto de 2025];5(Educativa):27-35. Disponible en: <https://rperspectivasinvestigativas.org/index.php/multidisciplinaria/article/view/366>
38. Cáceres DM, Tapella E, Cabrol DA. Métodos de investigación interdisciplinaria, participativa y multiactoral para estudiar los ecosistemas y sus beneficios. Ecología Austral [Internet]. 15 de marzo de 2025 [citado 30 de agosto de 2025];35(1):162-82. Disponible en: https://ojs.ecologiaaustral.com.ar/index.php/Ecologia_Austral/article/view/2439
39. Serrat-Roozen I, López-Navas L. Diálogo y Competencias Clave para Alcanzar una Sociedad Plural y Sostenible. Cuestiones Pedagógicas Revista de Ciencias de la Educación [Internet]. 30 de junio de 2025 [citado 30 de agosto de 2025];1(34):197-212. Disponible en: <https://revistascientificas.us.es/index.php/Cuestiones-Pedagogicas/article/view/26887>
40. González-López MM, Esquinas-López C, Romero-García M, Benito-Aracil L, Martínez-Momblan MA, Villanueva-Cendán M, et al. Intensidad de colaboración interprofesional y factores relacionados en las Unidades de Cuidados Intensivos. Un estudio descriptivo de tipo

transversal con enfoque analítico. Enfermería Intensiva [Internet]. 1 de julio de 2024 [citado 30 de agosto de 2025];35(3):188-200. Disponible en: <https://www.sciencedirect.com/science/article/pii/S1130239923000901>

41. Karen AR, Pablo-Andrés BH, Cadavid E Sara, A QH Gustavo, John V, Pablo-Andrés BH, et al. Experiencia de educación interprofesional en salud: Descripción e implementación en la Escuela de Medicina y Ciencias de la Salud de la Universidad del Rosario, Colombia. Editorial Universidad del Rosario; 2024. 157 p.

42. Pérez-Martinot M. El rol del mentor en la educación médica: historia, evolución y desafíos actuales. Revista Medica Herediana [Internet]. julio de 2024 [citado 30 de agosto de 2025];35(3):177-82. Disponible en: http://www.scielo.org.pe/scielo.php?script=sci_abstract&pid=S1018-130X2024000300177&lng=es&nrm=iso&tlng=pt

43. Alarcón R G. Educación médica, un desafío permanente. Cuadernos Médico Sociales [Internet]. 2 de agosto de 2024 [citado 30 de agosto de 2025];64(2):71-7. Disponible en: <https://www.cuadernosms.cl/index.php/cms/article/view/1982>

44. Ramos-Zaga F. Transformando la educación médica del siglo xxi: El rol de la educación médica basada en competencias. Revista de la Facultad de Medicina Humana [Internet]. enero de 2024 [citado 30 de agosto de 2025];24(1):169-78. Disponible en: http://www.scielo.org.pe/scielo.php?script=sci_abstract&pid=S2308-05312024000100169&lng=es&nrm=iso&tlng=pt

45. Escudero Bermello AI, Borroto Cruz ER, Díaz Contino CG, Escudero Bermello AI, Borroto Cruz ER, Díaz Contino CG. La formación médica desde la perspectiva hipocrática. Educación Médica Superior [Internet]. 2024 [citado 30 de agosto de 2025];38. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_abstract&pid=S0864-21412024000100027&lng=es&nrm=iso&tlng=en

46. Vivas DA. Vigencia de las tradiciones pedagógicas: una dialéctica entre paradigmas de la educación y la pedagogía con la formación médica contemporánea. Educación Médica [Internet]. 1 de mayo de 2024 [citado 30 de agosto de 2025];25(3):100899. Disponible en: <https://www.sciencedirect.com/science/article/pii/S1575181324000147>

47. Un análisis de experiencia omnicanal en compañías de redes de transporte a través del mobile marketing mix como impulsor de co-creación de valor: Un estudio de las empresas uber y lyft - ProQuest [Internet]. [citado 30 de agosto de 2025]. Disponible en: <https://www.proquest.com/openview/1ba757f0b883e1060d69a9eb2a5e97cd/1?pq-origsite=gscholar&cbl=18750&diss=y>

48. Morales Reyes RA. Animación Participativa Centrada en las Infancias.: Principios epistemológicos para la Animación Social Participativa para y con audiencias infantiles. Revista de Estudios Interdisciplinarios del Arte, Diseño y la Cultura [Internet]. 27 de julio de 2024 [citado 30 de agosto de 2025];(12):198-224. Disponible en: <https://masam.cuautitlan.unam.mx/seminarioarteydiseño/revista/index.php/reiadyc/article/view/268>

49. Rubio López EA. Percepción de bienestar del adulto mayor en la convivencia social. 24 de febrero de 2025 [citado 30 de agosto de 2025]; Disponible en: <https://ri-ng.uaq.mx/handle/123456789/11445>

50. Moreno Guaicha JA, Mena Zamora AA, Zepa Morloy LI, Moreno Guaicha JA, Mena Zamora AA, Zepa Morloy LI. Modelos de aprendizaje en la transición hacia la complejidad como un desafío a la simplicidad. Sophia, Colección de Filosofía de la Educación [Internet]. junio de 2024 [citado 30 de agosto de 2025];(36):69-112. Disponible en: http://scielo.senescyt.gob.ec/scielo.php?script=sci_abstract&pid=S1390-86262024000100069&lng=es&nrm=iso&tlng=es

51. Enríquez Vázquez L, Navarro Perales J. Explorar los matices: aprendizaje personalizado y adaptativo en la educación digital. RDU [Internet]. 19 de enero de 2024 [citado 30 de agosto de 2025];25(1). Disponible en: [https://www.revista.unam.mx/2024v25n1/explorar los matices aprendizaje personalizado y adaptativo en la educación digital](https://www.revista.unam.mx/2024v25n1/explorar%20los%20matices%20aprendizaje%20personalizado%20y%20adaptativo%20en%20la%20educacion%20digital)

52. Ávila Alba T, Gruberg Cazón H, Herbas Baeny E. Fundamentos teórico prácticos de investigación transdisciplinaria para investigadores docentes.

53. Ávila Picón, AR. Reafirmar la multidisciplinariedad: un compromiso renovado de interciencia - ProQuest [Internet]. [citado 30 de agosto de 2025]. Disponible en: <https://www.proquest.com/openview/6777cab98>

[86a9830af352c68db7d7924/1?pq-origsite=gscholar&cbl=27688](https://doi.org/10.24018/2474-8698.2025.3.1.3.050)

54. Zapata MG. Métodos de Solución de Conflictos: Innovación y Multidisciplinariedad ante los Retos Globales. MSC Métodos de Solución de Conflictos [Internet]. 27 de enero de 2025 [citado 30 de agosto de 2025];5(8):10-5. Disponible en: <https://revistamsc.uanl.mx/index.php/m/article/view/117>

55. La_Educacion.pdf [Internet]. [citado 30 de agosto de 2025]. Disponible en: https://ives.edu.mx/wp-content/uploads/2024/libro/La_Educacion.pdf#page=17

56. Becker CC. La gobernanza participativa: teoría, crítica y perspectivas para la reforma política. Revista del CLAD Reforma y Democracia [Internet]. 7 de noviembre de 2024 [citado 30 de agosto de 2025];(88):59-87. Disponible en: <https://revista.clad.org/ryd/article/view/gobernanza-participativa-reforma-politica>

57. Rodríguez Casallas DF, Páez Á, Román Acosta D, Rodríguez Torres E. Participación ciudadana, gobernanza democrática y derecho al desarrollo: una revisión sistemática. Telos: Revista de Estudios Interdisciplinarios en Ciencias Sociales [Internet]. 2024 [citado 30 de agosto de 2025];26(1):198-214. Disponible en: <https://dialnet.unirioja.es/servlet/articulo?codigo=9290651>

58. Vasco-Delgado JC, Lima-Quinde MA, Macas-Padilla BA, Vasco-Delgado LA. Ética en la implementación de tecnologías emergentes en entornos educativos: Ethics in the implementation of emerging technologies in educational settings. Multidisciplinary Latin American Journal (MLAJ) [Internet]. 1 de junio de 2025 [citado 30 de agosto de 2025];3(2):130-56. Disponible en: <https://mlaj-revista.org/index.php/journal/article/view/93>

59. Bruneau GA. Descolonizar la Ética de Inteligencia Artificial Para Políticas Públicas Inclusivas: Reflexiones Desde Latinoamérica. Revista Estado y Políticas Públicas. 2025;24(13):35-50.

60. Monarca H. Regímenes de verdad en educación. 2024 [citado 30 de agosto de 2025];1-208. Disponible en: <https://www.torrossa.com/en/resources/an/5776635>

61. Evaluación del impacto de las tecnologías digitales en los procesos de enseñanza y aprendizaje | Innova Science Journal [Internet]. [citado 30 de agosto de 2025]. Disponible en: <https://innovasciencejournal.omeditorial.com/index.php/home/article/view/52>

62. Lara-Rosano FDJ, Gallardo Cano A, Almanza Márquez SI. Teorías, métodos y modelos para la complejidad social [Internet]. 1.a ed. Ediciones Comunicación Científica; 2021 [citado 30 de agosto de 2025]. Disponible en: <https://comunicacion-cientifica.com/libros/teorias-metodos-y-modelos-para-la-complejidad-social-un-enfoque-de-sistemas-complejos-adaptativos/>

63. Albornoz M. Indicadores de innovación: las dificultades de un concepto en evolución. 2009;5.

64. Andrade Salazar JA, Villela Cervantes CE. El pensamiento complejo y la construcción de conocimiento: una perspectiva Moriniana. Rev Vid [Internet]. 29 de julio de 2024 [citado 30 de agosto de 2025];6(1):33-50. Disponible en: <https://revistavidacunori.com/index.php/revista/article/view/41>

65. Revista C. CEBRI Revista. [citado 30 de agosto de 2025]. El poder de la innovación ante el nuevo paradigma tecnoeconómico. Disponible en: <https://cebri.org/revista/br/artigo/113/el-poder-de-la-innovacion-ante-el-nuevo-paradigma-tecnoeconomico>

66. Vizologi. La sinergia de la innovación y la creatividad: un nuevo paradigma [Internet]. Vizologi. 2023 [citado 30 de agosto de 2025]. Disponible en: <https://vizologi.com/es/Sinergia-de-innovaci%C3%B3n-y-creatividad-nuevo-paradigma/>

67. Sierra CH. La senda escatológica del transhumanismo: sobre misticismo tecnológico y anhelos sobrenaturales. abril de 2024 [citado 30 de agosto de 2025]; Disponible en: <https://bdigital.uexternado.edu.co/handle/001/15615>

68. Valencia Zamora S. Influenciadores centennials: Generación de nuevos paradigmas a través del uso de teléfonos inteligentes. Cuadernos del Centro de Estudios en Diseño y Comunicación Ensayos [Internet]. 2024 [citado 30 de agosto de 2025];(224):255-69. Disponible en: <https://dialnet.unirioja.es/servlet/articulo?codigo=9681287>

69. Elinbaum P, Lerena-Rongbaux N, Vidoso R, Bil D. Construcción social y reconfiguración territorial de infraestructuras: Un análisis desde los paradigmas tecnoeconómicos. *Revista de Geografía Norte Grande*.
70. Lifshitz-Guinzberg A, Abreu-Hernández LF, Sepúlveda-Vildósola AC, Urrutia-Aguilar ME, Córdova-Villalobos JÁ, López-Bárcena J, et al. Pros y contras de las innovaciones en educación médica. *Gaceta médica de México* [Internet]. junio de 2021 [citado 30 de agosto de 2025];157(3):338-48. Disponible en: http://www.scielo.org.mx/scielo.php?script=sci_abstract&pid=S0016-38132021000300338&lng=es&nrm=iso&tlng=es
71. Chulde-Zhirve EH, Suarez-Flores VA, Simbaña-Lincango A, Chisaguano-Tapia JN, Espinosa-Aguirre WE. Estrategias para implementar la personalización del aprendizaje en aulas activas. *Revista Científica Retos de la Ciencia* [Internet]. 15 de septiembre de 2024 [citado 30 de agosto de 2025];1(4):99-114. Disponible en: <https://www.retosdelacienciaec.com/Revistas/index.php/retos/article/view/534>
72. Toscano Quispe SY, Abad Basantes CA, Alvear Looor JG, Sarango Romero VJ. Diseño de Proyectos Educativos en Línea Basados en la Metodología PACIE: Un Enfoque Constructivista para el Aprendizaje Activo y Colaborativo. *Código Científico Revista de Investigación* [Internet]. 30 de septiembre de 2024 [citado 30 de agosto de 2025];5(E4):529-45. Disponible en: <http://www.revistacodigocientifico.itslosandes.net/index.php/1/article/view/508>
73. Peña Rodríguez DJ. Innovación curricular y aprendizaje activo: El rol de la multimodalidad en la educación contemporánea. *Perspectivas* [Internet]. 30 de enero de 2025 [citado 30 de agosto de 2025];13(25):7-26. Disponible en: <https://www.perspectivas.unermb.web.ve/index.php/Perspectivas/article/view/461>
74. Moposita Poma MMM, Pozo Villares FGP, Yunda Cujilema LNY, Macías Fernández KFM. Innovación educativa y modelos constructivistas en la enseñanza. *Conexión Científica Revista Internacional* [Internet]. 23 de marzo de 2025 [citado 30 de agosto de 2025];2(2):73-88. Disponible en: <https://sapiensdiscoveries.com/index.php/CCIJ/article/view/42>
75. Márquez Beltrán JA. La Personalización del Aprendizaje: Un Enfoque para la Educación del Siglo XXI.pdf [Internet]. [citado 30 de agosto de 2025].; Disponible en: https://www.researchgate.net/profile/Jose-Marquez-Beltran/publication/383849822_La_Personalizacion_del_Aprendizaje_Un_Enfoque_para_la_Educacion_del_Siglo_XXI/links/66dc968464f7bf7b199d44e9/La-Personalizacion-del-Aprendizaje-Un-Enfoque-para-la-Educacion-del-Siglo-XXI.pdf

Conflict of interest

The author declares that there are no conflicts of interest between them, nor with the research presented.

Contributions from authors

Conceptualization: Miday Columbié-Pileta, María Aurelia Lazo-Pérez

Formal analysis: Miday Columbié-Pileta, María Aurelia Lazo-Pérez

Investigation: Miday Columbié-Pileta, María Aurelia Lazo-Pérez

Methodology: Miday Columbié-Pileta, María Aurelia Lazo-Pérez, Lina Jaquelin Castillo-Placencia, Alejandra María Loranca-Melgar, Jorge Mariano Barrios-Escobar, Julio Alberto Castillo

Project management: Miday Columbié-Pileta, María Aurelia Lazo-Pérez

Supervision: Miday Columbié-Pileta, María Aurelia Lazo-Pérez

Writing – original draft: Miday Columbié-Pileta, María Aurelia Lazo-Pérez, Jorge Mariano Barrios-Escobar

Writing – review and editing: María Aurelia Lazo-Pérez, Miday Columbié-Pileta, Lina Jaquelin Castillo-Placencia, Alejandra María Loranca-Melgar, Jorge Mariano Barrios-Escobar, Julio Alberto Castillo

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