

Review article



Professional development for social science teachers and student-scientific activity in pre-university education

La superación para profesores de ciencias sociales y la actividad científico-estudiantil en preuniversitario

A aperfeiçoamento para professores de ciências sociais e a atividade científico-estudantil no pré-universitário

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ABSTRACT

The research conducted delved into the professional development of pre-university social science teachers in relation to student research activities. Its objective was to develop a theoretical and practical strategy for the professional development of social science teachers that would support the growth of student research activities in pre-university schools in the Marianao municipality. Various social problems related to science and purely social issues were addressed, justified by the nature of the subject taught by the teachers and by the students' research activities. The study explored economic inequality, discrimination, unemployment, poverty, crime, violence, social exclusion, and

other related issues, as well as their root causes, which could be found in economic, political, and other factors. The study allowed for a descriptive investigation, considering the phenomenological aspects of postgraduate professional development for pre-university teachers in their use of learning resources and materials for their performance in the social sciences. The theoretical methods employed included analytical-synthetic, inductive-deductive, historical-logical, and systemic-structural-functional approaches. Empirical methods included observation, experimentation, expert opinion, document analysis, and survey and interview techniques. Statistical-mathematical methods were also used. The research presented proposals based on the premise that the professional development of these teachers and student research activities at the pre-university level are inseparable. This article stems from that research with the aim of disseminating theoretical frameworks on the professional development of social science teachers at the pre-university level and their connection to student research activities.

Keywords: student-scientific activity; pre-university education; postgraduate improvement.

RESUMEN

La investigación realizada profundizó en la superación de los profesores de ciencias sociales de preuniversitario, en relación con la actividad científico-estudiantil. Tuvo como objetivo elaborar una estrategia teórico-práctica para la superación de profesores de ciencias sociales que permita atender el desarrollo de la actividad científico-estudiantil en los preuniversitarios del municipio Marianao. Se abordaron diversos problemas sociales de la ciencia y problemas meramente sociales, justificado por la naturaleza de la asignatura impartida por los profesores y por la actividad investigativa de los estudiantes. Se profundizó en la desigualdad económica, la discriminación, el desempleo, la pobreza, la delincuencia, la violencia, la exclusión social y otros, así como en las causas que los originaron y que pudieron hallarse en aspectos económicos, políticos, etcétera. El estudio permitió realizar una investigación descriptiva, considerando los aspectos fenoménicos de la superación postgraduada de los docentes de preuniversitario en el uso de los recursos y objetos de aprendizaje, para su desempeño en las ciencias sociales. Se emplearon como métodos teóricos: analítico-sintético, inductivo-deductivo, histórico-lógico y sistémico-estructural-funcional; entre los empíricos: la observación, el experimento, el criterio de especialistas, el análisis de documentos y las técnicas de encuesta y entrevista. También se emplearon métodos estadístico-matemáticos. La investigación ofreció sus propuestas considerando que la superación de esos profesores y la actividad científico-

estudiantil en preuniversitario, son inseparables; de ella se derivó este artículo con el objetivo de socializar referentes teóricos sobre la superación de los profesores de ciencias sociales en preuniversitario y la actividad científico-estudiantil.

Palabras clave: actividad científico-estudiantil; preuniversitario; superación postgraduada.

RESUMO

A investigação realizada aprofundou-se na melhoria dos professores pré-universitários de ciências sociais, relativamente à atividade científico-estudante. Seu objetivo foi desenvolver uma estratégia teórico-prática de aperfeiçoamento de professores de ciências sociais que permita o desenvolvimento da atividade científico-estudante nas escolas pré-universitárias do município de Maricao. Foram abordados vários problemas sociais da ciência e problemas meramente sociais, justificados pela natureza da matéria lecionada pelos professores e pela atividade de investigação dos alunos. Aprofundou-se na desigualdade econômica, na discriminação, no desemprego, na pobreza, na criminalidade, na violência, na exclusão social e outros, bem como nas causas que os originaram e que podem ser encontradas nos aspectos econômicos, políticos, etc. O estudo permitiu realizar uma investigação descritiva, considerando os aspectos fenomênicos do aperfeiçoamento pós-graduado de professores pré-universitários no uso de recursos e objetos de aprendizagem, para sua atuação nas ciências sociais. Foram utilizados os seguintes métodos teóricos: analítico-sintético, indutivo-dedutivo, histórico-lógico e sistêmico-estrutural-funcional; entre as empíricas: observação, experimento, julgamento especializado, análise documental e técnicas de levantamento e entrevista. Métodos estatístico-matemáticos também foram utilizados. A pesquisa apresentou suas propostas considerando que o aperfeiçoamento desses professores e a atividade científico-estudante no pré-universitário são indissociáveis; dele derivou este artigo com o objetivo de socializar referenciais teóricos sobre o aperfeiçoamento de professores de ciências sociais em atividade pré-universitária e científico-estudante.

Palavras-chave: atividade científico-estudante; pré-universitário; aprimoramento da pós-graduação.

INTRODUCTION

To justify that this research topic on professional development for social science teachers and student scientific activity in pre-university education encompasses social problems of science and technology, it is necessary to address some underlying theoretical issues. Initially, it must be made clear that the sciences study reality based on its problems; that is, on its unanswered questions. They are increasingly oriented toward practical applications, fostering technological development and, consequently, innovation. Science involves the search for truth, strives for rigor and objectivity, and is, above all, the production, dissemination, and application of knowledge, which occur within the framework of social relations permeated by practical-material and ideological-evaluative factors.

The sciences have developed from the problems they aim to solve, but what is a problem? It is a situation, circumstance, or dilemma that requires a solution, an answer, or clarification. "It is the visible manifestation of an undesirable situation. It is the effect or symptom that we detect and want to eliminate" (Ibáñez, 2024). Specifically, social problems are those that affect a society as a whole. This concept has been defined by many authors, but the most current definition is worth considering, in which a social problem is a "situation that negatively affects the personal or social life of individuals, or the well-being of communities or larger groups within a society, and about whose nature, causes, or solution there is often public disagreement" (Stuart, 2026). The definitions presented for "problem" and "social problem" demonstrate the authors' intention to define these terms from their essence, a characteristic that can be observed in other definitions over the years.

Social problems include economic inequality, discrimination, unemployment, poverty, crime, violence, social exclusion, and others. These problems affect large segments of the population and are related to the objective and subjective conditions of life in society. Their causes can be found in economic, political, and other factors. Furthermore, social problems often have consequences in other dimensions of a nation's life.

One of the major drawbacks of social problems is their difficulty in resolving them: it's complicated to reach a consensus on which are most urgent or what methodology should be used to address them; they can stem from various causes, depending on the nature of the problem. For example, economic inequality and inequality of opportunity are often a consequence of the historical construction of a society with the very rich and the very poor. On the other hand, economic

inequalities can also result from political dynamics that have catastrophic effects on the economy, which only the wealthiest segment of the population can survive.

Furthermore, poverty and lack of resources often translate into violent attitudes, social resentment, crime, and the proliferation of other criminal activities. Sometimes desperation leads to breaking the laws of a society perceived as unjust. Therefore, it is not easy to pinpoint the causes of the social problems the world suffers. Meanwhile, technology has emerged as a mechanism for exchanging information, structuring it, and aiming for the inclusion of the greatest number of people seeking to access its benefits.

Science and technology have evolved at a rapid pace, bringing with them a series of changes on an international scale. In this context, globalization has permeated virtually all fields of human activity: economics, culture, politics, ecology, thus acquiring a multidimensional character. A current view of this term considers that there is no consensus on what should be understood by globalization... it is one of the basic axes that shapes and structures the contemporary world economy (Martínez, 2024). In economic terms, globalization occurs through the trade flows of capital, information, and knowledge that circulate around the world and involve, to a greater or lesser extent, most countries; however, this process favors a small group of highly developed nations, which control the world economy.

Politically, globalization is characterized by major armed conflicts (the First and Second World Wars), hemispheric economic crises, and protectionist and discriminatory policies. Globalization is underpinned by the deepening of the international division of labor, where a handful of highly developed countries hold sway. Socially, globalization affects the Human Development Index. This index does not include respect for human rights, democracy, and equality; nor has it been applied equally to all countries, and those that are most economically and technologically developed are not necessarily the ones showing the best results. While it can be said that there has been significant progress in human development, most countries remain outside the benefits of globalization.

The topic under investigation—professional development for social science teachers regarding student research activities in pre-university education—has been studied by many researchers, given its richness and the social need for further exploration. By its very nature, it is relevant to the development of the tutorial competence that teachers offer in supporting student research activities, due to its importance in achieving better teacher performance. This includes considering the teacher's

pedagogical, methodological, guidance, research, and professional development roles, which enhance their preparedness to support student research. Gallego and Diego (2024) highlight how didactic preparation facilitates interdisciplinary learning across content areas, enabling the teacher's comprehensive development. They emphasize that their publications also contribute to the understanding of comprehensive teacher training, which includes preparation for guiding student research. Zambrano *et al.* (2024) are also included, who published on social problems, particularly considering how the digital age provides opportunities to address social problems of varying nature and complexity. Thus, digital technology can be used to enhance access to education and health care.

These authors believe it is possible to delve deeper into the theoretical frameworks of the research topic, as these frameworks form the basis of the professional development that pre-university social science teachers should receive. They provide teachers with the essential content to support student research activities that address social problems. Currently, however, limitations exist that hinder the research process. These limitations stem primarily from a lack of theoretical and methodological training for social science teachers in developing student research activities at the pre-university level, resulting in insufficient guidance for students in their scientific endeavors.

These difficulties define the scientific problem as: how to contribute to overcoming them? What is the role of social science teachers in developing student-scientific activity at the pre-university level? The object of study is the professional development process for pre-university social science teachers. The objective of this research is to develop a theoretical and practical strategy for the professional development of social science teachers that addresses the needs of social science teachers in fostering scientific and student activity at the pre-university level. The development of scientific-student activity in pre-university education in the Marianao municipality and has as its field of action the improvement of social science teachers for the development of scientific-student activity in pre-university education.

This article stems from this research and aims to share theoretical frameworks on the professional development of pre-university social science teachers to guide student research activities. This work is part of the research project: Pedagogical Innovation for Sustainable Education at the Ciudad Escolar Libertad Pedagogical Theme Park. The analysis conducted allows for a deeper understanding of the research topic and addresses, with a robust theoretical foundation, the limitations inherent in the research, delving not only into social problems but also into the social problems of science.

DEVELOPMENT

Social problems of science

Scientific activity in Cuba, understood as a cultural and economic institution of national scope, began with the literacy campaign and grew steadily until the mid-1990s, when the Special Period brought this development to a sudden halt. The limitations of Cuban science extend beyond the aforementioned historical and international factors. Less science is produced than is needed, and the research that is conducted and could have immediate application faces numerous obstacles, including a lack of innovation. Other problems include: the spread of pseudoscientific practices among many Cubans and in various state institutions; the disconnect between scientific institutions and between these institutions and the country's productive and organizational structure; the presence of many managers in the sector with little or no scientific training; science programs that award university degrees in four years but attract few students; a system of research programs and projects with too many priorities, too broad, and with a discouraging bureaucratic and contractual component; and university education where, even in technical science programs, programming elements are barely introduced. Mulet (2023) concludes that solving these problems is a necessary condition to recover the path of scientific development.

Zambrano *et al.* (2024) point out that problems in science give rise to problems that affect all of society, which must be included in the professional development of teachers in the scientific-student sphere. Among these problems are hunger, insecurity, discrimination, poverty, inequality, the climate emergency, armed conflicts, racism, and gender violence, all of which are closely interrelated and whose main consequence is the forced displacement of millions of people worldwide, a figure that increases year after year due primarily to wars, hunger, and climate change (Zambrano *et al.*, 2024). The sciences delve into these problems seeking solutions, and specifically Pedagogy and Didactics are essential sciences for teachers to develop their professional work, although it is necessary that once they graduate they continue to improve themselves to be in better conditions to solve the problems of the profession and, more specifically, to solve the Social Problem of Science and Technology (SPST) determined in terms of guaranteeing the adequate training of students (Zambrano *et al.*, 2024).

Pre-university education

It is necessary to delve deeper into the pre-university education process, whose mission is the training of high school graduates. This encompasses grades 10th through 12th and is the level where young people broaden, deepen, and generalize their knowledge, enriching their general capacities and skills in order to continue their university studies (Jiménez & Verdecia, 2021). The students' ages range from 14 to 18 years. The development of these students' personalities takes place in a social context where they must face new and greater personal, family, academic, socio-political, and community demands.

The purpose of pre-university education is the integral formation of the young person in their way of feeling, thinking and acting responsibly in the school-family-community contexts, based on the development of a comprehensive general culture, supported by the Martí principle of study-work (Figure 1).

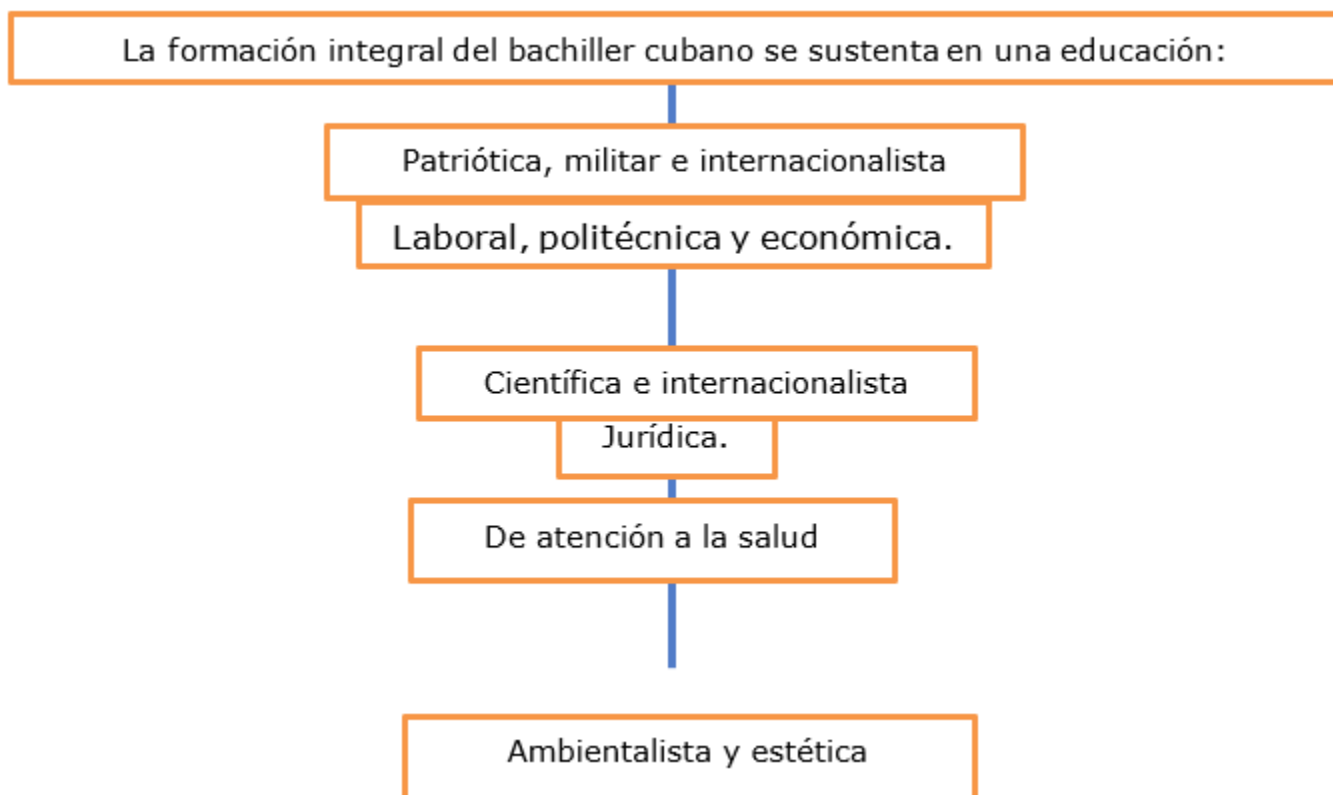


Figure 1. High school graduate training process

Source: Own elaboration

Within this subsystem are schools with special objectives and characteristics, whose enrollment is the result of a rigorous selection process, based on the students' conditions, aptitudes, aspirations, and future life plans. Among them (MINED, 2007):

- Pre-University Institute in the Countryside (IPUEC).
- Pre-University Vocational Institute of Pedagogical Sciences (IPVCP).
- Emerging Training Schools for Primary Teachers (EFEMP).
- Pre-University Vocational Institute of Exact Sciences (IPVCE).
- Higher School of Athletic Improvement.
- Camilo Cienfuegos Military School (EMCC).
- National School of Art Instructors (ENIA).

Pre-university education marks the culmination of the final cycle of general education, an important part in the formation of young people's personalities.

Overcoming

From the above perspective, scientific development is essential for professional development; it is inherent to general culture and necessary to adapt professional performance. Teacher preparation is not guaranteed solely through initial training but must continue within their own professional activity, as a requirement of social development, so as not to fall behind the advances of humanity and to be in accordance with the needs of the society in which they operate; hence, the term "professional development" is used.

In the case of pre-university social science teachers, all the professional development they receive must be directed towards the educational process; therefore, they receive pedagogical professional development, understood as "A systematic process aimed at professional and human improvement, at the development of the knowledge, skills, values and professional qualities of the teaching staff" (Mondeja *et al.*, 2022).

The New Postgraduate Regulations of the Republic of Cuba of 2019 establish the main organizational forms of professional development:

1. Postgraduate training includes courses, training programs, and diplomas. Other forms of professional development include self-study, specialized conferences, seminars, workshops,

scientific debates, and others that complement and enable the study and dissemination of advances in knowledge, science, technology, and art.

2. Postgraduate academic training: master's degree, postgraduate specialization and doctorate.

The conditions under which the improvement is planned and executed respond to the demands imposed by the accelerated transformations taking place in the pre-university and to the needs of the teaching staff in general, especially graduates.

Scientific-student activity in pre-university

The scientific activity of pre-university students constitutes an important way of preparing future professionals in research methods and channeling their scientific interests; it is a substantive process alongside teaching and other activities. García Márquez said: "The idea that science only concerns scientists is as unscientific as it is unpoetic to say that poetry only concerns poets" (Betancourt *et al.*, 2022, p. 18).

At this level, student scientific activity is the organizational form of the teaching process whose fundamental objective is to contribute to the development of skills and habits specific to technical and investigative work in students through the search for answers to increasingly complex scientific problems, using the scientific method and under the guidance of a teacher (Hernández-García *et al.*, 2021). The development of scientific and investigative activities by pre-university students contributes to their training as future professionals, in whose careers they will have to work as researchers; this prepares them to solve the problems they will encounter.

Blanco and Téllez (2024, pp. 318-338) wrote about the scientific training of students in the Pre-University Vocational Institutes of Exact Sciences (IPVCE). Thus, their proposals for formative activities for preparing students from a scientific and investigative perspective can be considered, and these were the following (Figure 2).



Figure 2. Activities for the future professional training of high school graduates

Source: Own elaboration

These actions were implemented in the two pre-university schools in the Marianao municipality of Havana during the 2024-2025 school year, with excellent acceptance from the faculty and administrators, which guarantees that the objectives set in the pre-university centers' research projects can be achieved. Student scientific activity is also very important at the pre-university level, as it contributes to achieving the objectives specific to this level (Suárez *et al.*, 2024). For these students, research, in its different stages, it allows them to discover knowledge on a given subject for themselves, but always with the optimal preparation of the teachers who lead this activity and who manage to elevate it through postgraduate training. Other authors, such as Palenzuela *et al.* (2021), from Granma, declare the relationship that exists between scientific-investigative activity, social changes and the incorporation of new information technologies into the research process.

Riquelme (2023) argues that the methodology of scientific and educational research possesses cognitive domains for developing research skills in the training of professionals capable of addressing local, national, and global problems through innovative solutions that create value and positively impact society. Innovating teaching through research proposes new ways of teaching and learning, becoming promoters of transdisciplinary learning. This involves mastering knowledge management strategies, teamwork, and awareness of the problems in their lived context and the planet. It requires

students to learn how to conduct research and develop pedagogical and scientific competencies in their field.

Recent international research confirms that ongoing teacher professional development is a priority in contemporary education (Karataş, 2025). A thematic analysis of 454 articles published in SSCI Q1 journals during 2024 identified teacher professional development as the most comprehensive research area in the field of education, followed by teacher employment dynamics, teachers' beliefs and emotions, and teaching practices (Karataş, 2025). This finding supports the need to address the professional development of social science teachers as a central element for improving student research activity at the pre-university level.

Along the same lines, Van Vijfeijken *et al.* (2024) evaluated a professional development program designed to promote teacher agency in support of social justice and educational equity. The results demonstrated that participating teachers developed a greater awareness of inequalities and a critical stance toward their own practices, school policies, and the education system as a whole (Van Vijfeijken *et al.*, 2024). These findings underscore the importance of teacher development programs not being limited to technical aspects, but rather addressing ethical and social dimensions linked to contemporary problems, as has been noted in the Cuban context for stimulating academic talent in higher education (Rodríguez Pérez *et al.*, 2019).

Furthermore, studies on the use of socio-scientific issues in education have shown that they constitute an innovative approach to integrating real-world problems into the classroom, promoting critical thinking and interdisciplinary learning. One review found that the objectives of SSI-based teaching focus primarily on developing higher-order thinking skills and scientific content knowledge, while the topics addressed are grouped into two main areas: environment and sustainable development, and health and technology (Sánchez Muñoz *et al.*, 2025). This international evidence reinforces the relevance of including social issues arising from scientific and technological advancements in the professional development of social science teachers.

Continuing professional development for social science teachers is a topic of growing interest in international educational research at the postgraduate level and in specialized publications. Zayimoglu Ozturk *et al.* (2025), in a bibliometric study based on the Scopus database, demonstrate that academic interest in teaching competencies has steadily increased over the past twenty years, with most publications concentrated in the field of social sciences and in article format.

This finding supports the relevance of investigating the professional development of social science teachers at the pre-university level, an area that requires systematic attention from contemporary educational research.

Regarding innovative pedagogical approaches, Klijnsstra et al. (2024) conducted a professional development program for social science teachers in the Netherlands, focusing on teaching social scientific reasoning (SSR). The results indicated that subject-specific educational curriculum materials served as a catalyst for teachers' professional growth, enabling them to develop a deeper understanding of the complexity and specific nature of social scientific reasoning.

This study underscores the importance of designing contextualized teaching resources that enable teachers to address complex social problems in the classroom, a central aspect of student science activity. Furthermore, integrating socio-scientific issues (SSI) into teacher training has proven to be an effective way to promote critical thinking and global citizenship. Ozturk and Kopish (2024) implemented a site-based intervention and role-playing activities on climate change with pre-service teachers in Turkey, finding that this approach improved their understanding of the nature of science and cultivated their values as global citizens.

Furthermore, a professional development program on the Socio-Scientific Issues and Model-Based Learning (SIMBL) framework revealed that teachers' prior beliefs and experiences shape their ability to integrate these innovative approaches into classroom practices, categorizing teachers into three groups: proactive, collaborative, and teacher-led (Gencel & Kopish, 2025).

In the context of pre-university education, informal interdisciplinary research programs have shown promising results. Al- Thani *et al.* (2025) conducted a meta-analysis of a chemistry research experience program for high school students, demonstrating that such initiatives increase students' engagement and interest in science and research careers. This finding is particularly relevant for the professional development of social science teachers, who must be prepared to foster student scientific activity from an interdisciplinary perspective.

These results emphasize the need to establish professional learning communities that offer autonomous support, relational connection, and active competence, essential elements to transform teacher development and enhance student-scientific activity in pre-university education.

CONCLUSIONS

The foundations addressed regarding postgraduate training for social science teachers on student scientific activity in pre-university offer alternatives that satisfy the approach and contribution to solving the Social Problem of Science and Technology (SPST): how to solve the contradiction that arises on a social scale between postgraduate training for social science teachers and student scientific activity in pre-university?

For all the above reasons, the objective of this work is considered fulfilled, since analyses have been performed that allow the socialization of theoretical references on the improvement of social science teachers at the pre-university level and the scientific-student activity.

Overcoming The pre-university teachers have theoretical references that justify it as a basic need for the proper training of students at this level and, particularly, to guide their scientific-student activity, which shows that they are inseparable, the quality of one guarantees the excellence of the other, with the consequent benefit for all of society.

REFERENCES

- Al-thani, N. J., Siby, N., Saad, A., Bhadra, J., Qahtani, N., Sellami, A., & Ahmad, Z. (2025). Meta-analysis of chemistry-based interdisciplinary informal research experience program for high school students. *Evaluation and Program Planning*, 102517. <https://doi.org/10.1016/j.evalprogplan.2025.102517>
- Betancourt Torres, I., Alpízar Caballero, L., & Panesso Patino, V. (2022). Integración de ciencias y tecnología para la solución de problemas sociales en la cultura. *Revista Varona*, 75. <http://scielo.sld.cu/pdf/vrcm/n75/1992-8238-vrcm-75-e1730.pdf>
- Blanco Gómez, M., & Téllez Lazo, L. (2024). Formación científica de estudiantes y profesores en institutos preuniversitarios vocacionales de ciencias exactas. Acciones propuestas. *Revista Didáctica y Educación*, 15(4). <https://revistas.ult.edu.cu/index.php/didascalía/issue/view/85>
- Gallego Jiménez, M. G., & Diego Mantecón, M. Á. (2024). Proyecto interdisciplinar en los grados de educación: La integración de IA en dos asignaturas de Educación Infantil. *Revista*

Internacional de Educación y Aprendizaje, 12(1), 33–42.

<https://doi.org/10.62701/revedu.v12.5180>

Gencel, E., & Kopish, M. (2025). Exploring teachers' professional development on socioscientific issues and model-based learning: A multiple case study. *Science & Education*, 34(6), 4451-4490. <https://doi.org/10.1007/s11191-025-00628-1>

Hernández-García, F., Pérez García, E., Viera Hernández, E., Alberti Cairo, A., González Díaz, E., & Pérez Calleja, N. (2021). Actividad científica estudiantil: su dinamismo en el proceso docente educativo en la universidad médica avileña. *EDUMECENTRO*, 13(4).

http://scielo.sld.cu/scielo.php?script=sci_isore&Pid=S2077-28742021000400021&Ing=es

Ibáñez, A. (2024). *Diferencia entre problema y fenómeno: aplicando el análisis de causa raíz correctamente*. Mairu digital. <https://mairu.digital/diferencia-problema-fenomeno>

Jiménez, R., & Verdecia, E. (2021). *Educación en Cuba. Criterios y experiencias desde las ciencias sociales*. Facultad Latinoamericana de Ciencias Sociales. Publicaciones Acuario, Centro Félix Varela. <https://biblioteca-repositorio.clacso.edu.ar/bitstream/CLACSO/5795/1/Educacion-Cuba.pdf>

Karataş, F. (2025). Current trends in teacher education research: A thematic and content analysis of articles published in SSCI Q1 indexed journals. *Educational Academic Research*, (58), 169-183. <https://doi.org/10.33418/education.1659296>

Klijnstra, T., van Boxtel, C. A. M., & van Hout-Wolters, B. H. A. M. (2024). Design principles for promoting students' social scientific reasoning about social problems. *Journal of Social Studies Research*, 48(3), 215-232. <https://doi.org/10.1177/23522798241238459>

Martínez, Á. (2024). Una visión actualizada de la globalización. *Revista de Economía Crítica*, (37). <https://www.upo.es/revistas/index.php/rec/article/view/10702/9396>

Mondeja, O., Concepción, P., & Lorenzo, Y. (2022). La gestión de la superación profesional pedagógica del profesorado universitario novel. *Revista Única*, 10(2). <https://portal.amelica.org/ameli/journal/780/7803972003/html/>

- Mulet Concepción, Y. (2023). Descentralización territorial: lecciones para el caso de Cuba. *Espacios Públicos*, 23(59). <https://doi.org/10.36677/espaciospublicos.v23i59.20774>
- Ozturk, F. Z., & Kopish, M. (2024). Promoting preservice teachers' global citizenship and contextualised NOS views through role-play activities integrated into place-based SSI instruction on climate issues. *International Journal of Science Education*, 46(6), 590-619. <https://doi.org/10.1080/09500693.2023.2251189>
- Ozturk, F. Z., Kopish, M., & Ozturk, T. (2025). The ongoing trend in teacher competence: A bibliometric analysis of Scopus. *International Journal of Research in Education and Science*, 11(1), 166-189. <https://eric.ed.gov/?id=EJ1465910>
- Palenzuela, M., Aroche, A., & Fernández, R. (2021). La actividad científico-investigativa en estudiantes de la carrera Pedagogía-Psicología. *Roca. Revista Científico - Educacional de la Provincia Granma*, 17(1). <https://revistas.udg.co.cu/index.php/roca/article/view/2145>
- Riquelme Estrada, E. (2023). *Metodología de la Investigación Científica y Educativa*. Atena Editora. Ponta Grossa – Paraná – Brasil. <https://educapes.capes.gov.br/bitstream/capes/738266/1/metodologia-de-la-investigacion-cientifica-y-educativa.pdf>
- Rodríguez Pérez, L., Aguiar Santiago, X. M., & Santos Puente, E. (2019). Estimular el desarrollo de alumnos talentos en las condiciones actuales de la educación superior. *EDUMECENTRO*, 11(1), 160-183. http://scielo.sld.cu/scielo.php?script=sci_abstract&pid=S2077-28742019000100160&lng=es&nrm=iso&tlng=es
- Sánchez Muñoz, M., Flores-Eraña, A., Silva-Campos, J., Chavira-Quintero, M., & Olais-Govea, J. M. (2025). *GenAI as a cognitive mediator: A critical-constructivist inquiry into computational thinking in pre-university education*. Tecnológico de Monterrey. https://research.tec.mx/vivo-tec/display/AcademicArticleSCO_105016885110
- Stuart, M. (2026). *Problema social*. Editores de Britannica. <https://www.britannica.com/topic/social-issue>

Suárez Fernández, D., Bauta Leyva, L., & Aldana Aldana, Y. (2024). La actividad científica estudiantil de la Universidad de Moa. *Revista Ciencias de la Información*, 14(1).

<https://dialnet.unirioja.es/ejemplar/646644>

Van Vijfeijken, M., van Schilt-Mol, T., van den Bergh, L., Scholte, R. H. J., & Denessen, E. (2024). An evaluation of a professional development program aimed at empowering teachers' agency for social justice. *Frontiers in Education*, 9, 1364550.

<https://doi.org/10.3389/feduc.2024.1364550>

Zambrano, D., Zambrano, M., & Delgado, A. (2024). Problemas sociales derivados del avance de la ciencia y la tecnología. *Maestro y Sociedad*, 21(3), 1047-1059.

<https://maestrosociedad.uo.edu.cu/index.php/MyS/article/view/6472>

Conflict of interest

Authors declare no conflict of interests.

Authors' contribution

The authors participated in the design and writing of the article, in the search and analysis of the information contained in the consulted bibliography.



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