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SYSTEMATIZATION OF PROFESSIONAL PRACTICES ARTICLE

Rethinking science from the university social studies and the transformation of doctoral education

Repensar la ciencia desde la universidad los estudios sociales y la transformación de la formación doctoral

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Abstract Internal communication in public health institutions is a key operational axis and an essential space for the production and circulation of organizational knowledge. This study, from a critical organizational perspective, diagnosed the internal communication dynamics within a Cuban healthcare institution, identifying strengths, weaknesses, and opportunities for structural improvement. Using a qualitative, non-experimental, and descriptive design, participant observation, semi-structured interviews, and document analysis were conducted, with thematic coding performed using Atlas.ti. A hierarchical structure was observed, characterized by limited feedback, strong reliance on informal channels, and a lack of strategic planning in communication management. These conditions hinder transparency, demotivate staff, and limit the institution's responsiveness. However, spontaneous collaborative practices and a willingness for interpersonal dialogue were also noted, representing valuable resources for bottom-up institutional transformation. It is necessary to professionalize internal communication, institutionalize protocols, and democratize information flows. Communication should be addressed as a transversal component of public management, constitutive of both power and organizational knowledge. The study provides conceptual and practical tools for rethinking the relationship between communication, institutional authority, and organizational epistemologies in the field of public health.

Keywords organizational communication, public health, internal communication, structural barriers, institutional culture.

Resumen La comunicación interna en las instituciones de salud pública es un eje operativo clave y un espacio esencial para la producción y circulación del conocimiento organizacional. Este estudio diagnosticó, desde una perspectiva organizacional crítica, las dinámicas comunicativas internas en una institución sanitaria cubana, identificando fortalezas, debilidades y oportunidades de mejora estructural. Mediante un diseño cualitativo, no experimental y descriptivo, se aplicaron observación participante, entrevistas semiestructuradas y análisis documental, utilizando Atlas.ti para la codificación temática. Se observó una estructura jerárquica con escasa retroalimentación, fuerte dependencia de canales informales y ausencia de planificación estratégica en la gestión comunicacional. Estas condiciones afectan la transparencia, desmotivan al personal y limitan la capacidad de respuesta institucional. No obstante, se observaron prácticas colaborativas espontáneas y disposición al diálogo interpersonal, consideradas recursos valiosos para una transformación institucional ascendente. Es necesario profesionalizar la comunicación interna, institucionalizar protocolos y democratizar los flujos informativos. La comunicación debe abordarse como un componente transversal de la gestión pública, constitutivo del poder y del conocimiento organizacional. El estudio aporta herramientas conceptuales y prácticas para repensar la relación entre comunicación, autoridad institucional y epistemologías organizativas en el ámbito de la salud pública.

Palabras clave comunicación organizacional, salud pública, comunicación interna, barreras estructurales, cultura institucional.

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PUBLIS EDITORIAL

Introduction

The classical view of science is based on the division between ways of knowing. In his now-classic work, "The Two Cultures" (1959), C. P. Snow denounced the fracture introduced into contemporary culture, dividing it into two distant territories: science on one side and the humanities on the other. The result of this split is the impoverishment experienced by the fields located on either side of the divide. This fragmentation has not disappeared and has been confirmed by current studies, which indicate the persistence of disciplinary separation even in supposedly integrative academic environments (Nowotny, 2022).

This is how specialists in different fields of knowledge are trained, both at the undergraduate and graduate levels. This assertion clashes with the everyday perception, almost unanimously shared by students, professors, and specialists, which accepts a "division of scientific labor" that isolates the sciences from the humanities. These separations are well established in the current institutional order; they are studied in separate undergraduate and graduate programs, sometimes located in different university centers, without generating effective mechanisms for curricular integration (Jasanoff, 2023).

Hence, there is a need for a more humanistic perspective, one that focuses on humankind, their happiness, and their values, when analyzing science and technology. Additionally, a more scientific and technological foundation is required to understand humankind and its spiritual life. This perspective is consistent with the proposals of Leach et al. (2021), who emphasize the need for training researchers who can understand socio-environmental complexity from a transdisciplinary perspective. Thus, the goal is to break down the disciplinary barriers between the sciences and humanities, promoting the development of joint research and integrating work teams that can bridge the gap between the two cultures.

In this sense, it is necessary to teach the phenomenon of science and technology in its connection with society, thereby demonstrating to teachers and researchers the ethical and social commitment to the discipline they work on for the society in which they operate. As recent literature demonstrates, science should be understood not only as a rational activity, but also as a culturally mediated and politically conditioned process (Latour & Woolgar, 2020).

Since the 1960s, various efforts have been made to integrate the social studies of science and technology into an interdisciplinary perspective, which has received various names, including science studies, science of science, science and technology studies, and science, technology, and society, among others. In Spanish, the term "Science, Technology, and Society Studies" (STSS) has been primarily coined, motivated by the growing evidence of the negative impacts—military, environmental, and social—derived from the use of scientific and technological knowledge. This led to an ethical and political concern that is now consolidated as a fundamental field of study for understanding the consequences of scientific development.

A basic consensus has emerged: "While science and technology provide us with numerous positive benefits, they also bring with them negative impacts, some of which are unforeseeable, but all of which reflect the values, perspectives, and visions of those in a position to make decisions concerning scientific and technological knowledge" (Cutcliffe, 1990). This idea has been taken up and updated by contemporary authors, such as Stilgoe, Owen, and Macnaghten (2023), who propose anticipatory and inclusive governance frameworks for responsible science.

Today, STSS constitute a significant area of research in academia, public policy, and education. This field aims to comprehend the social aspects of scientific and technological phenomena, encompassing both their determinants and their social and environmental implications. Its general approach is critical and interdisciplinary, integrating disciplines such as philosophy, history, sociology of science and technology, anthropology, and even political economy. STSS define a well-established institutional field in universities, public administrations, and educational centers in numerous industrialized countries, as well as in Latin America (Brazil, Argentina, Mexico, Venezuela, Colombia, and Uruguay).

In this context, universities are called upon to play a key role. According to UNESCO (2023), universities must transform themselves into institutions that foster social and scientific innovation through epistemic inclusion, which involves recognizing diverse forms of knowledge and plural forms of knowledge production.

STSS are an interdisciplinary field that has transformed the traditional understanding of science as a purely rational and objective activity, one that is disconnected from its social context. Instead, STSS propose a critical vision that considers science and technology as social constructions shaped by economic interests, cultural values, power relations, and institutional structures (Jasanoff, 2004; Latour, 2020). One of the key contributions of this field is the concept of co-production of knowledge, which proposes that science and society mutually shape each other; there is no scientific knowledge outside of the social practices that support it (Jasanoff, 2004). This notion has been fundamental to analyzing how scientific decisions imply ethical, political, and cultural choices.

Another essential concept is reflexivity, which requires researchers to be aware of the assumptions, frameworks, and effects of their knowledge production. This epistemological and ethical reflexivity has become a guiding principle of responsible scientific practices in the 21st century (Nowotny,

2022). The STSS also incorporate a profound critique of the linear view of innovation. Authors such as Helga Nowotny, Bruno Latour, and Ulrich Beck have argued that technologies are not neutral and that their development must be assessed in terms of their social and environmental impact. This concept emerges from the idea of responsible innovation, which is understood as a form of technological development guided by democratic principles, social justice, and sustainability (Stilgoe et al., 2023).

In pedagogical terms, STSS have influenced the design of training programs that promote transdisciplinarity, understood not only as a dialogue between disciplines but also as an articulation between academic and non-academic knowledge, as well as between formal science and situated knowledge (Harding, 2020). This perspective aims to democratize science, incorporating the voices of communities, social actors, and traditionally excluded forms of knowledge. The relevance of STSS for doctoral training lies in their capacity to equip future researchers with the necessary tools to question dominant epistemological frameworks, understand science as a social and political phenomenon, develop critical skills to analyze the social implications of their research, and adopt ethical and democratic principles in the production of knowledge.

In Latin America, STSS have been reinterpreted in light of the region's historical and social contexts. Authors such as Kreimer (2011) and Vessuri (2015) have advocated for a situated reading of science, focusing on local issues like technological dependence, environmental injustice, and inequalities in access to knowledge. These perspectives have strengthened a critical, decolonizing, and transformative approach to scientific education. Thus, the theoretical foundations of STSS not only provide an analytical framework for understanding science in society but also constitute an indispensable training tool for a university committed to sustainable human development and cognitive justice.

This article forms part of a methodological approach to systematizing professional experiences, conceived as a rigorous process of critical reflection on significant practices to recover lessons learned, achievements, tensions, and challenges, thereby transforming and transferring knowledge. Specifically, it systematizes the experience developed in the doctoral program at the Central University "Marta Abreu de Las Villas" (UCLV), focusing on the incorporation of STSS as a theoretical and methodological core to strengthen the critical scientific culture of doctoral students.

Methodology

The methodological process was structured in five phases, following the models proposed by Oscar Jara (2018) and adapted to the academic specificity of the Cuban university context. The first phase, Starting point, focused on identifying the training problem to be addressed: the persistent fragmentation between the sciences and humanities, and the limited critical appropriation of STSS frameworks by doctoral students. This problem arose from prior diagnoses conducted by the academic faculty and from the review of thesis papers, which revealed theoretical gaps.

The second phase, Recovery of the lived process, involved the systematic collection of empirical materials generated during the experience. These included curriculum planning documents, teaching materials, work produced by doctoral students, class records, evaluation rubrics, and teaching team logs.

The third phase, Critical reflection, consisted of collective analysis and discussion sessions with the participants. In these spaces, significant learnings were identified alongside common methodological obstacles and epistemic tensions—particularly those arising from the contrast between traditional positivist approaches and critical STS perspectives. These insights were systematized into analytical matrices.

The fourth phase, Construction of meaning, entailed reinterpreting the experience through contemporary conceptual frameworks in STS studies—such as the co-production of knowledge (Jasanoff, 2004), responsible innovation (Stilgoe et al., 2023), and epistemic justice (Medina, 2018). This process allowed the findings to be reframed and made visible the formative transformations achieved by doctoral students.

Finally, the fifth phase, Projections, established recommendations for future doctoral cohorts. These included integrating STSS into the curriculum from the start of the training process, providing training for teacher-facilitators with a critical approach, and fostering interdisciplinary learning communities.

Qualitative and participatory techniques were employed to develop the methodological approach. Participant observation during course sessions enabled the capture of key interactions, discursive dynamics, levels of conceptual appropriation, and spontaneous reactions from the participants (Angrosino, 2012). A document review was also carried out, analyzing the curriculum design, suggested bibliography, evaluation rubrics, minimum exam protocols, and teaching guides. Additionally, content analysis was applied to the essays and final projects submitted by doctoral students, using analytical categories derived from the STS approach—such as reflexivity, co-production, and the social implications of knowledge.

Focus groups were conducted with students and instructors from the course, organized into disciplinary subgroups, to gather perceptions, lessons learned, experienced tensions, and suggestions for improvement. Expert peers validated the question guide used in these sessions. This methodological approach is situated within the qualitative, interpretive, and dialectical paradigm, aligned with the principles of STSS,

which consider educational practice as a social, situated, conflictual, and transformative process (Harding, 2020; Nowotny, 2022).

The triangulation of sources (discourses, documents, and direct observation) and perspectives (teachers, doctoral students, and facilitators) strengthened the interpretive validity and critical relevance of the findings. Ethical principles of informed consent, confidentiality, and voluntary participation were ensured throughout all stages of the process.

Results and discussion

The systematization of the STSS enabled us to identify multiple significant outcomes in the field of doctoral training, both in terms of conceptual learning and attitudinal and methodological transformations among doctoral students. The main findings are presented below, along with a critical reflection on their relevance and scope:

Strengthening theoretical and critical culture. One of the most relevant achievements was the reconstruction of knowledge about the history, epistemological foundations, and current controversies of science. Through the STS approach, participants were able to highlight the social nature of science and question positivist or deterministic views present in their respective disciplines. This critical capacity was reinforced through interdisciplinary dialogue, which aligns with the findings of authors such as Sismondo (2010) and Jasanoff (2023), who emphasize the importance of fostering reflexivity in scientific education.

Appropriation of the dialectical approach. Many doctoral students expressed that the course allowed them to recognize contradictions in their subjects of study and to adopt the dialectical method not only as a theoretical tool but also as a way to interpret phenomena from a complex logic. This appropriation involved overcoming epistemological obstacles that had previously hindered their research progress, in line with the proposals made by Núñez Jover (2006).

Development of participatory and democratic skills. The results-sharing workshop served as a space for collective knowledge construction and sharing. The presentation and critical discussion of the research not only allowed for the improvement of theoretical frameworks but also facilitated the sharing of methodological strategies helpful to all attendees. This fostered an open attitude toward debate, peer evaluation, and self-criticism —core elements of STS pedagogy (Stilgoe et al., 2023).

Awareness of the social impacts of science. The course raised the awareness of doctoral students regarding the ethical role of researchers and the social responsibility of science. By analyzing the political, economic, and environmental impacts of their projects, the students demonstrated a greater ability to connect their academic work with environmental issues. This transformation reflects the principle of science with and for society, championed by UNESCO (2023).

Identification of methodological obstacles. Despite the achievements, weaknesses were also recognized in the coordination between the STS course and doctoral mentoring processes. Some participants noted that the incorporation of new STS theoretical frameworks was not fully understood or supported by their mentors, which generated tensions and doubts about the scientific legitimacy of their work. This highlights the need also to train faculty in contemporary approaches to research training.

Improvement projections. Based on the emerging discussions, it was proposed to include the course as a required module within the doctoral curriculum, as well as to create permanent spaces for interdisciplinary exchange. It was also recommended that a teaching guide be developed for faculty and students to ensure greater coherence between theory, practice, and assessment.

In short, the experience allowed us to empirically validate the usefulness of STS Studies in transforming doctoral training processes from a critical, ethical, and socially engaged perspective. As Nowotny (2022) points out, 21st-century scientific training must break with the illusion of neutrality and open itself to new ways of thinking about science, based on complexity, responsibility, and dialogue between knowledge sources.

The systematized experience has not only generated transformations in the training of doctoral candidates but also poses challenges and opportunities for the institution. Below are the main lines of institutional involvement and proposals for curricular improvement, aimed at strengthening doctoral training from an STS perspective and promoting its sustainability.

To transcend the one-off experience, UCLV should consider:

- Formalize the STSS as a mandatory module within the doctoral curriculum, so that all doctoral students receive a common critical foundation.
- Incorporate it into the curriculum with academic recognition, through credits, to increase its visibility and institutional value.
- Establish institutional support (via Vice-Rectorates and postgraduate coordination) with resource support and recognition of the teaching profile of facilitators.

This logic responds to international trends that recommend the formalization of ethical and epistemological components in advanced training (European University Association, 2021).

The tensions observed between doctoral students and tu-

tors emphasize the need to:

- Conduct STS training workshops for teachers, aimed at strengthening their understanding of critical approaches, transdisciplinary methodologies, and ethical analysis of research.
- Establish an academic community of practice that brings together STS professors, researchers, and facilitators for regular exchange of experiences and collective review of cases.

This type of teacher training is aligned with models such as the "faculty development" in the US and Canada, which has been shown to improve the appropriation of critical pedagogies in higher education (Bland et al., 2022).

It is recommended to implement a flexible and interdisciplinary curricular redesign aimed at fostering genuinely transdisciplinary training processes:

- Design thematic itineraries or routes that integrate STS with specific disciplines, fostering joint training between the sciences and humanities.
- Implement mandatory seminars or modules on responsible innovation, with case studies contextualized to the Cuban and Latin American context.
- Create regular spaces for interdisciplinary exchange, such as STS conference series, social innovation labs, or internal symposia.
- To advance critical and responsible training, it is proposed:
- Include STS criteria in thesis evaluation (e.g., reflexivity, consideration of impacts, interdisciplinarity, commitment to the environment).
- Promote critical defense-type exams where the doctoral candidate presents not only technical results but also social implications and forms of co-production of knowledge.
- Establish an evaluation framework co-constructed by faculty and doctoral students, based on STS principles, to ensure legitimacy and transparency.

Creation of international and regional STS networks to enrich the experience and ensure its sustainability:

- Promote articulation with international networks (for example, the European Association for the Study of Science and Technology (EASST) and regional (CLACSO, STSS Network in Latin America), facilitating participation in conferences and publications.
- Initiate academic collaborations with universities in Brazil, Argentina, or Mexico that already integrate STS into their doctoral programs, to receive feedback and share their own experience.

This strategy also responds to UNESCO's (2023) recommendation on building alliances to strengthen cognitive justice and cooperation among higher education institutions.

Proposals for continuous evaluation and improvement to ensure the quality, relevance, and impact of the STSS course:

- Develop qualitative and quantitative indicators based on co-production of knowledge, reflexivity, ethics, and transdisciplinarity.
- Apply longitudinal evaluations throughout the doctoral program to monitor the impacts on research practice.
- Share results internally through internal seminars and outside of UCLV through publications and presentations in specialized forums.

These proposals enable us to transition from a pilot experience to a sustainable and inclusive academic policy, thereby strengthening institutional capacities for truly critical, socially engaged doctoral training that aligns with contemporary challenges. Table 1 presents the institutional proposals formulated as a result of the systematization process of the STSS course.

This table summarizes the proposed actions to institutionally transform doctoral training based on the lessons learned from systematized experience. These actions are aligned with Cuba's national postgraduate policy (MES, 2022), which promotes academic quality and the social relevance of scientific training.

Conclusions

This article reports on a doctoral training initiative at Marta Abreu de Las Villas Central University that integrated STSS to enhance critical understanding, interdisciplinary debate, and awareness of the social and ethical dimensions of research. The experience demonstrated significant pedagogical and epistemological benefits, but also encountered structural barriers, including institutional resistance and limited faculty expertise. It recommends faculty training, curricular institutionalization, and fostering communities of practice, offering transferable lessons for Latin American universities seeking more critical, inclusive, and socially engaged doctoral education.

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Table 1. Institutional proposals derived from the systematization of the STSS course

Dimension	Specific proposal	Observations
Doctoral Curriculum	Incorporate STSS as a compulsory accredited module	Improves the coherence of the graduate profile with a critical and transdisciplinary vision
Teacher training	Conduct STSS refresher workshops	It allows for overcoming epistemological tensions with tutors
Interdisciplinarity	Create interdisciplinary STS seminars, thematic routes, and symposia	It promotes horizontal academic networks and dialogue between knowledge
Investigative evaluation	Include STSS criteria in the evaluation of the thesis and defenses	Incorporates ethics, social impact, and reflexivity as quality components
International links	Integrate STSS networks (CLACSO, STSS Network, EASST)	Promotes academic mobility, joint projects, and interdisciplinary publications
Monitoring and continuous improvement	Apply STSS indicators and perform longitudinal impact monitoring	Ensures the sustainability of curricular innovation

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Conflicts of interest

The authors declare that they have no conflicts of interest.

Author contributions

María de los Ángeles Castillo & Diana N. Concepción: Conceptualization, data curation, formal analysis, investigation, methodology, supervision, validation, visualization, drafting the original manuscript and writing, review, and editing.

Data availability statement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Statement on the use of AI

The authors acknowledge the use of generative AI and AI-assisted technologies to improve the readability and clarity of the article.

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