

INTERDISCIPLINARY MOTHER TONGUE STRATEGY FOR MECHANICAL ENGINEERING AT THE UNIVERSITY OF MOA

ESTRATEGIA DE LENGUA MATERNA CON ENFOQUE INTERDISCIPLINARIO PARA LA CARRERA DE INGENIERÍA MECÁNICA DE LA UNIVERSIDAD DE MOA

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ABSTRACT

An interdisciplinary strategy was designed for teaching the mother tongue in the Mechanical Engineering program at the University of Moa, linking linguistic content with the technical disciplines of the specialty to develop students skills in writing technical reports and structuring professional texts. Diagnostic tests of communicative competencies were applied to first- and second-year students, interviews were conducted with technical subject teachers, and the main textual genres required in the professional practice of mechanical engineers were identified. By integrating linguistic content with the real needs of the profession, allows training more competent professionals and capable of communicating effectively in their professional practice.

KEYWORDS: communicative skills; comprehensive training; learning; higher education

RESUMEN

Se diseñó una estrategia interdisciplinaria para la enseñanza de la lengua materna en la carrera de Ingeniería Mecánica de la Universidad de Moa, que vincule los contenidos lingüísticos con las disciplinas técnicas de la especialidad para desarrollar en los estudiantes habilidades en la redacción de informes técnicos y en la estructuración de textos profesionales. Se aplicaron pruebas diagnósticas de competencias comunicativas a estudiantes de primer y segundo año, entrevistas a docentes de asignaturas técnicas y se identificaron principales géneros textuales requeridos en la práctica profesional del ingeniero mecánico. Al integrar los contenidos lingüísticos con las necesidades reales de la profesión, se forman profesionales más competentes, capaces de comunicarse con eficacia en su ejercicio profesional.

PALABRAS CLAVE: habilidades comunicativas; formación integral; aprendizaje; educación superior

INTRODUCTION

The essential communicative skills for mother tongue development (listening, speaking, reading and writing) acquire particular importance in the preparation of professionals in training across programs, years and groups, for their better professional performance in the subsequent work context. A language strategy alone is insufficient; it must be specified based on the diagnosis of each group and in correspondence with the work that the pedagogical collective is capable of carrying out (Cosme & Salazar, 2017); therefore, providing attention is today an unavoidable need for professors. Oral and written communication problems among university students remain an issue to be resolved by all teachers, aiming to achieve the development of oral and written language as macro skills of great significance for professionals. Hence, it is important that

students in training receive systematic treatment throughout the program, enabling modes of action consistent with the challenge they must achieve after graduation (de Zayas et al., 2019).

In Cuba, higher education faces the challenge of training competent professionals capable of solving complex problems in increasingly demanding contexts. Mechanical engineering cannot be limited to mastering technical content; it must necessarily include the development of communicative skills that allow the future engineer to perform effectively in the professional environment.

The University of Moa, as a training institution for mechanical engineers, needs to address the oral and written communication insufficiencies evidenced by many students when faced with professional tasks such as writing technical reports, preparing projects, presenting results or interpreting specialized documentation. This situation is not unique to the Cuban context; recent research in mechanical engineering programs in Argentina has identified similar perceptions among both teachers and students regarding difficulties in producing academic and professional texts (Rosso et al., 2024). The difficulties sometimes respond to decontextualized mother tongue teaching, far from the real problems of the profession.

To overcome this limitation, interdisciplinarity is presented as a way. Contemporary pedagogical trends at the university level are based on postulates that contemplate interdisciplinary relationships as an indispensable component of the formative process. The integration of the mother tongue with technical disciplines allows the student to develop communicative skills in specific situations of their future professional performance. As Fernández (2008) affirms, one cannot speak of transformations in the school without substantial changes occurring in education professionals; this requires educators to be professionals committed to their time, willing and able to train permanently and adapt creatively to change.

Cuban educational policy has paid primary attention to the mother tongue at all educational levels. Since 1996, it was proclaimed as a guiding program; in this sense, all teachers were informed of the need for its treatment in any discipline within the educational process (Cosme & Salazar, 2017).

In the Cuban context, Study Plan «E» for the Mechanical Engineering program establishes the need for comprehensive training that articulates the contents of different disciplines. Interdisciplinarity is not an end in itself but a means to enable students to transfer and apply their knowledge in diverse contexts. The pedagogical reality at the university shows that students are not aware of the logical processes for constructing texts, whether oral or written; furthermore, there is no total responsibility regarding the use of oral or written language.

In this sense, the present research intends to propose an interdisciplinary strategy for mother tongue teaching in the Mechanical Engineering program at the University of Moa, to develop students' skills in writing technical reports and structuring professional texts.

MATERIALS AND METHODS

Theoretical level:

Analysis-synthesis: used in the analysis of sources that provided the theoretical foundations of the research and in the interpretation of results derived from the initial diagnosis, in the elaboration and substantiation of the assumed strategy and in determining partial and general conclusions.

Historical-logical: used to characterize the object of research by determining the main tendencies and regularities in its historical development.

Induction-deduction: taken into account for the study of documents, research reports and consulted bibliographic sources.

Empirical level:

Observation: used to determine the scientific problem, characterize the current state of the investigated field and verify the main results obtained from this research.

Survey: used to determine the current state of the scientific problem and to verify the main results; interviews with specialists and other professionals were also conducted.

RESULTS AND DISCUSSION

Some considerations about interdisciplinarity in engineering training

Problems in engineering typically have more than one solution, and the engineer's work consists of obtaining the best possible solution by applying knowledge from various disciplines (González, Rodríguez & Sánchez, 2022). This complex nature of professional practice demands that university education promote the establishment of interdisciplinary relationships among the subjects that students take.

In this sense, Fernández (2008) has pointed out that didactics, as a science of education, plays a significant role in the training of professionals so that, through their work, they fulfill the teaching-methodological function that society assigns to them. From this perspective, the teacher is not the absolute owner of information nor the only source of knowledge acquisition but must be capable of problematizing reality and developing work projects that promote the development of intelligence, creativity and will in those involved in the teaching-learning process. The interdisciplinary approach in mechanical engineering training responds not only to general pedagogical considerations but also to recent evidence. Rosso et al. (2024) affirm that both teachers and mechanical engineering students agree that academic and professional writing should be taught in articulation with technical content, since communicative

difficulties negatively impact performance in subjects such as Projects, Maintenance and Strength of Materials. Furthermore, Arruti et al. (2025) demonstrate that when communication strategies integrated into technical subjects are implemented, not only writing and oral expression skills improve, but the understanding of engineering concepts themselves also deepens.

Didactics as a mediating science

To understand the role of the mother tongue in mechanical engineer training, it is pertinent to turn to the postulates of Fernández (2008), who conceives didactics as a theoretical system of mediation between participants in the teaching-learning process. This conception is remarkable for the present work because the mother tongue cannot be an end in itself but rather content for mediation and interaction among all participants in the formative process; he also states that the teaching-learning process is characterized by its great complexity and diversity, being a consciously modeled process to promote the development of citizens from the school.

This affirmation supports the need to intentionally model the integration between mother tongue and technical disciplines, so that the development of communicative skills adequately contributes to the comprehensive training of the future engineer.

Mother tongue as a professional tool

The mother tongue is a heritage element of the nation and a fundamental identity exponent of the people. In Cuba, it is a component of the study curriculum at all educational levels and an indispensable requirement for entry into Higher Education (Martínez, Morales & Torres, 2023). The professional communication of the mechanical engineer depends on different discursive genres: maintenance reports, calculation memoranda, facility projects, technical manuals, expert reports, among others. Each text demands a specific

mastery of the language in terms of structure, register, terminology, and textual properties (coherence, cohesion, appropriateness).

The production of academic and professional texts by university students requires learning strategies that consider the diversity of textual genres. In this sense, several authors have proposed approaches that transcend isolated language teaching: Carlino (2017) defends the concept of "academic literacy" to refer to the teaching process that addresses reading and writing practices specific to each discipline, not as general skills but as particular ways of constructing knowledge in each field of knowledge.

Furthermore, the "Writing Across the Curriculum" movement, systematized by Bazerman et al. (2016), proposes that writing should be a learning tool present in all subjects, not only in language courses. Both approaches support the need for interdisciplinary integration in mechanical engineer training.

Principles for the interdisciplinary strategy

Based on the reviewed theoretical references, the following are assumed:

- Professional contextualization: Linguistic contents are approached based on situations and specific texts to the field of mechanical engineering.
- Communicative functionality: Teaching focuses on the communicative functions that the engineer requires in their professional practice.
- Unity between the instructive and the educational: As Fernández (2008) points out, the teaching-learning process must achieve "objectives closely linked to the achievement of the law of unity between instruction and education." This implies that, when teaching linguistic and technical content, attention must also be paid to the formation of values, attitudes and professional commitment in students.

Structure of the strategy

The strategy, as a scientific result, has been the object of study of various Cuban researchers. De Armas, Vázquez & Lorence (2003), cited by Marín et al. (2023), state that the strategy must be directed toward achieving a previously established objective and that, given its systemic nature, it seeks a qualitative change from the real state to the desired state, through the dialectical articulation between objectives (goals pursued) and methodology (ways implemented to achieve them). In this endeavor, strategies have played a predominant role based on their use.

Falcón (2021) considers that the strategy is oriented toward achieving an objective, following a pattern of action. It allows relating and implementing the general policies and objectives outlined in a field. It emphasizes the way of projecting and directing the solution to a problem based on actions organized into phases or stages in the medium and/or long term that allow solving the researched problem.

Furthermore, Salguero & Pérez (2023) affirm that "the strategy constitutes a feasible way to solve problems in the educational field, by allowing the planning of actions that lead to the achievement of the pursued objectives." The above denotes that the strategy must be aimed at achieving a previously established goal or objective, which, due to their dynamism, are important for incorporating transformations into educational practice that contribute to improving the process and achieving the desired state.

Arruti et al. (2025) assure that, after implementing this type of strategy, 83.8% of students improved their understanding of technical content by integrating writing and oral communication practices into specialty subjects. These results support the incorporation of authentic and participatory assessment instruments in the present strategy.

Based on the analysis of evaluations from engineering students and professors, Flores (2018) identified that the main demand of students is precisely to receive writing instruction linked to the real tasks of their discipline and not as abstract, decontextualized content. However, unlike what was previously expressed—centered exclusively on perceptions—the present proposal moves toward an operational model that systematically articulates mother tongue and technical disciplines throughout the entire program.

On this basis, the proposed strategy is organized into three fundamental stages (diagnosis, execution and evaluation), based on models implemented in interdisciplinary experiences at Cuban universities.

Stage I: Diagnosis and planning

Objective: To identify students' communicative needs and establish bases for interdisciplinary integration.

Actions:

- Characterization: Evaluation of students' communicative competencies at the beginning of the program, using diagnostic tests that include reading comprehension and basic text production.
- Curriculum analysis: Identification of technical subjects where written and oral communication have the greatest relevance (Projects, Maintenance, Thermodynamics, Strength of Materials).
- Determination of professional genres: Preparation of an inventory of textual genres that the mechanical engineer uses in their practice (reports, projects, expert reports, manuals, minutes).
- Teaching coordination: Establishment of methodological agreements between mother tongue professors and those in technical disciplines for the joint planning of interdisciplinary activities.

Stage II: Execution of interdisciplinary actions

Objective: To develop students' communicative skills through integrative tasks that articulate the mother tongue with technical content.

Lines of work:

Comprehension of technical texts

Suggested activities:

- Reading and analysis of mechanical equipment manuals
- Interpretation of technical standards and specification
- Extraction of relevant information from specialized articles
- Elaboration of summaries and syntheses of technical documentation

Interdisciplinary relationships: Mechanical Drawing (interpretation of plans), Materials (technical specifications), Thermodynamics (comprehension of diagrams and tables).

Production of professional texts

Suggested activities:

- Writing of workshop and laboratory practice reports
- Elaboration of descriptive project memory
- Writing of maintenance procedures
- Preparation of technical specification folders

Interdisciplinary relationships: Mechanical Workshop (practice reports), Projects (memories), Maintenance (procedures).

Professional oral communication

Suggested activities:

- Presentation of project and research results
- Participation in simulated technical seminars
- Oral defense of reports and proposals
- Simulation of technical and work meetings

Interdisciplinary relationships: All subjects requiring socialization of results.

Technical terminology

Suggested activities:

- Elaboration of technical glossaries by specialty
- Analysis of term formation (composition, derivation, linguistic borrowings)
- Precise use of terminology in professional contexts
- Differentiation between everyday language and technical language

Interdisciplinary relationships: Fundamentals of Mechanical Engineering, Materials, Manufacturing Processes.

Integration modalities:

a) *Integrative tasks*: Activities designed jointly by language and technical discipline professors, where the student applies linguistic and technical

knowledge. For example: «Write the technical report of the tensile test conducted in the materials laboratory, attending to the appropriate structure, register and terminology».

b) *Interdisciplinary projects*: Longer-term works that articulate various subjects and culminate in communicative products (final report, oral presentation, scientific poster).

c) *Technical writing workshops*: Sessions where the writing of professional genres is practiced with personalized guidance.

Stage III: Evaluation and adjustment

Objective: To assess the impact of the strategy and make necessary adjustments for continuous improvement.

Actions:

- Communicative performance evaluation: Analysis of the quality of texts produced by students in different technical subjects. In this sense, recent experiences in evaluating communicative competence in mechanical engineering students have demonstrated that the use of specific rubrics, self-assessments and collaborative work in interactive classrooms allows performance to be measured and significantly improved.
- Graduate follow-up: Consultation with graduated mechanical engineers and employers about the communicative competencies required in professional practice.
- Institutional self-assessment: Evaluation by the faculty collective of the effectiveness of the implemented actions.
- Curricular adjustments: Incorporation of evaluation results to improve the strategy.

Example of application

Illustratively, an example of an integrative task for the second year of the program is presented:

Component	Description
Subjects involved	Mother Tongue + Strength of Materials
Technical content	Tensile test of metallic materials
Linguistic content	Structure of the technical report, formal register, description of procedures, use of graphics and tables
Task	Prepare the complete technical report of the tensile test conducted in the laboratory, including: introduction (objectives, applied standards), description of the procedure, presentation of results (tables, stress-strain graph), analysis of results, and conclusions
Evaluation	Written technical report
Evaluation criteria	Clarity and precision in description, appropriateness of register, textual coherence and cohesion, grammatical and orthographic correctness, quality of technical analysis, formal presentation

For the implementation of the strategy, the following are required:

Human resources: Mother tongue professors and technical discipline professors willing to engage in collaborative work.

Material resources: Collection of authentic technical texts (manuals, reports, standards); guides for the production of professional genres; access to specialized publication databases.

Organizational resources: Time slots for teaching coordination; establishment of a stable interdisciplinary collective.

By integrating linguistic content with the real needs of the profession, more competent professionals are trained, capable of communicating effectively in their professional practice.

CONCLUSIONS

Interdisciplinarity is not an option but a necessity in contemporary higher education. Its implementation requires institutional will, willingness for collaborative work, and a conception of language as an essential tool for professional performance. This manifests curricular integration; gradual progression, where communicative tasks increase in complexity throughout the program; and authentic assessment, where communicative competence is evaluated in real professional tasks.

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