

Original scientific report

Theoretical and methodological foundations of the strategy for developing the competence to reuse open educational resources

Fundamentos teóricos metodológicos de la estrategia para la formación de la competencia reutilizar recursos educativos abiertos

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Abstract

Introduction: The development of the competence to reuse open educational resources by university professors is essential for fostering pedagogical innovation and ensuring the sustainability of knowledge within the open education ecosystem. Its development requires the integration of disciplinary, pedagogical, technological and ethical-legal knowledge.

Objective: To present the theoretical and methodological foundations of a pedagogical strategy for developing the competence to reuse open educational resources among university professors, based on the expansion of the Technological Pedagogical Content Knowledge model by incorporating ethical-legal knowledge as a transversal and indispensable dimension.

Methods: The research was conducted using a mixed-methods approach, descriptive in nature with a predominance of qualitative analysis. Theoretical methods such as analysis-synthesis, induction-deduction, and literature review were employed, supported by open-access academic databases and repositories, with temporal filters between 2000 and 2024.

Result: The analysis allowed for the identification of the theoretical frameworks that underpin the pedagogical strategy from philosophical, pedagogical, didactic, sociological, psychological, and technological perspectives. The expansion of the *Technological Pedagogical Content Knowledge* model with the ethical-legal component justifies the competence to reuse open educational resources as a critical and responsible practice. From the intersections between pedagogical, content, technological, and ethical-legal knowledge emerge applied knowledge that guides teaching decision-making and favors an ethical and transformative use of open educational resources.

Conclusion: The theoretical and methodological foundations of the pedagogical strategy provide a conceptual framework that integrates principles of innovation, collaboration, and sustainability to guide teaching practice towards the critical and responsible integration of open

educational resources in higher education.

Keywords: pedagogical strategy, open educational resources, teacher competencies, TPACK, educational innovation, higher education

Resumen

Introducción: La formación de la competencia reutilizar recursos educativos abiertos del profesor universitario es fundamental para desarrollar la innovación pedagógica y garantizar la sostenibilidad del conocimiento en el ecosistema de la educación abierta. Su desarrollo exige integrar saberes disciplinares, pedagógicos, tecnológicos y ético-legales.

Objetivo: Exponer los fundamentos teóricos y metodológicos de una estrategia pedagógica para la formación de la competencia reutilizar recursos educativos abiertos del profesor universitario, partir de la ampliación del modelo *Technological Pedagogical Content Knowledge* con la incorporación del conocimiento ético-legal como dimensión transversal imprescindible.

Métodos: La investigación se desarrolló con enfoque mixto, de carácter descriptivo y predominio cualitativo. Se emplearon métodos teóricos como análisis-síntesis, inducción-deducción y revisión bibliográfica, apoyada en bases de datos y repositorios académicos de acceso abierto, con filtros temporales entre 2000 y 2024.

Resultado: El análisis permitió enunciar los referentes teóricos que sustentan la estrategia pedagógica desde los enfoques filosóficos, pedagógicos, didácticos, sociológicos, psicológicos y tecnológicos. La ampliación del modelo *Technological Pedagogical Content Knowledge* con el componente ético-legal justifica la competencia reutilizar recursos educativos abiertos como práctica crítica y responsable. De las intersecciones entre los conocimientos pedagógico, de contenido, tecnológico y ético legal emergen saberes aplicados que orientan la toma de decisiones docentes y favorecen un uso ético y transformador de los recursos educativos abiertos.

Conclusión: Los fundamentos teóricos metodológicos de la estrategia pedagógica aportan un marco conceptual que articula principios de innovación, colaboración y sostenibilidad para orientar la práctica docente hacia la integración crítica y responsable de los recursos educativos abiertos en la educación superior.

Palabras clave: estrategia pedagógica, recursos educativos abiertos, competencias del docente, TPACK, innovación educativa, educación superior

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Introduction

The accelerated incorporation of information and communication technologies (ICT) in higher education has expanded the possibilities for access, production, and circulation of knowledge, generating new demands on teaching practice. In this scenario, the use of open educational resources has consolidated as a viable alternative to promote more flexible, collaborative, and

contextualized teaching.

One of the most widely disseminated definitions of open educational resources is the one stated by UNESCO (2019), which has proposed that they are "digitized materials offered freely and openly for educators, students, and self-learners to use and reuse for teaching, learning, and research" (p. 3).

Their effective use requires the development of specific competencies that allow university professors to use, adapt, and enrich these resources critically and ethically. Among these competencies, the reuse of open educational resources occupies an essential place. The specialized literature shows a conceptual polysemy of the term that links it to practices such as use without modification, aggregation, combination, technical interoperability, and contextual adaptation (Arias, 2013; Wiley, 2018). These approaches, initially associated with learning objects (LO), have evolved with the rise of open educational resources, shifting the technical focus towards a more pedagogical, ethical, and contextualized one.

It is important to highlight that the open access movement has broadened the scope of the concept of reuse, linking it not only to educational resources but also to scientific information and research data. In this context, reuse is associated with the secondary use of previously generated data, which requires that the information be available in accessible and standardized digital formats. This technical condition becomes a fundamental principle to guarantee transparency and compliance with public dissemination commitments. In line with this, Monsiváis Carrillo (2020) affirms that "there is no right of reuse if a right of access is not guaranteed" (p. 115).

For their part, Rodríguez-Delis (2019) explains that the reuse of open educational resources is related to the most common ways of adapting or altering the original educational resource: mixing, adaptation, and extraction of elements. In this appreciation, the authors present adaptation and mixing as reuse operations. In this regard, Santos-Hermosa and Abadal (2022) propose three forms of reuse: direct use, the creation of derivative resources, and the combination of resources, highlighting the legal, technical, and pedagogical challenges this implies.

Despite its relevance in the digital environment and open access, the systematization of the subject has shown that reuse has not been explicitly addressed as a competence in the training frameworks of university professors. It has remained implicit in the competence of digital content creation, without clearly distinguishing between both actions. Creating open educational resources implies generating a resource from scratch; reusing, on the other hand, involves recognizing, selecting, adapting, or combining existing resources to give them new meanings in diverse contexts. This difference is not trivial: while the creation of open educational resources is linked to original authorship, reuse demands specific skills of analysis, contextualization, curation, and pedagogical adaptation.

In a general sense, its treatment has been insufficient, centered on technical or instrumental



aspects, without a systematization that allows understanding it as a complex, situated, and ethically oriented know-how. In the Cuban context, where higher education committed to equity, technological sovereignty, and pedagogical innovation is promoted, this omission represents a training gap that needs to be addressed.

Considering the above and the dynamics that occur in this process based on collaboration, personal interactions, and communication between the subjects involved, the authors of this research conceive the reuse of open educational resources as a professional competence, a synthesis of pedagogical, didactic, digital, ethical, and legal knowledge of the university professor in their teaching function, expressed in an integral performance during the process of knowledge construction and the transformation of the educational context into an open and collaborative learning ecosystem.

This conception is linked to what was proposed by Salazar *et al.* (2024), who, when defining generic competencies in their research proposal, emphasize the need to integrate knowledge, skills, values, and attitudes in close relation to the particularities of the institutional and social environment, thereby guaranteeing the relevance and continuity of university education. Along these same lines, the formation of the competence to reuse open educational resources is understood as a pedagogical, didactic, and digital process that requires being planned, organized, and implemented intentionally. This process implies the articulation of knowledge and values that enable the university professor not only to use available resources but also to adapt and contextualize them based on the real needs of their teaching practice.

Thus, the following contribution aims to present the theoretical and methodological foundations for the formation of the competence to reuse open educational resources. This will constitute a way to strengthen the digital teaching competence of university professors and the development of open educational practices in higher education.

Methods

The research was developed with a mixed-methods approach, descriptive in nature and with a qualitative predominance, aimed at systematizing the theoretical and methodological foundations of the pedagogical strategy for the formation of the competence to reuse open educational resources in university professors. Theoretical methods such as analysis-synthesis, induction-deduction, and bibliographic review were used, which allowed organizing and refining information from different documentary sources. These methods facilitated the identification of regularities, the construction of categories, and the conceptual foundation of the proposed pedagogical strategy.

Open-access academic databases and repositories were consulted (Scielo, Redalyc, Dialnet, DOAJ, as well as Cuban and Latin American institutional repositories). The search used combinations of keywords in Spanish and English: pedagogical strategy, scientific result, open educational resources, digital teaching competence, open educational resources, pedagogical strategy, scientific result, digital competence, TPACK. Boolean operators (AND, OR) and time range filters

(2000--2024) were used.

Results and discussion

The formation of the competence to reuse open educational resources requires a pedagogical strategy that becomes an essential theoretical foundation to guide training actions. This strategy is structured into three interrelated components: theoretical, methodological, and practical, and seeks to prepare the university professor to integrate open educational resources into their professional practice through the critical use of Web 2.0 tools, promoting accessible, contextualized, and socially committed teaching.

Authors such as Álvarez (2021), Colunga (2022), De Armas Ramírez and Valle Lima (2011), Sotomayor & Águila (2021), and Marín Llaver *et al.* (2023) have conceptualized the strategy as a scientific result. Their contributions highlight it as a flexible instrument to promote pedagogical innovation, favor the formation of research competencies, offer alternatives for solving complex problems, and promote curricular and institutional transformation, all aimed at enhancing the professional performance of the teacher.

Based on these theoretical references, the pedagogical strategy for the formation of the competence to reuse open educational resources of the university professor is structured as a process that directs short, medium, and long-term actions, in correspondence with the general and specific objectives. The proposed strategy, as a scientific result, contributes to exalting the professional performance of the teacher through the integration of pedagogical, technological, disciplinary, and ethical-legal knowledge.

According to Colunga (2022), a strategy conceived as a scientific result can contribute both on a practical and theoretical level, provided it is based on a solid, argued conceptual body with the capacity to generate new knowledge, perspectives, or approaches within the scientific field. Under this premise, the pedagogical strategy proposed here contributes to theoretical development by identifying the necessary knowledge for the formation of the competence to reuse open educational resources, based on a re-reading of the TPACK model (Technological Pedagogical Content Knowledge), formulated by Mishra & Koehler (2006).

The pedagogical strategy for the formation of the competence to reuse open educational resources of the university professor assumes the TPACK model from a systemic perspective, in which pedagogical, technological, and disciplinary knowledge are articulated with the processes and actors involved in teaching practice. The novelty lies in the recontextualization of the model by explicitly incorporating the ethical-legal knowledge linked to the reuse of open educational resources, which allows identifying new intersections between knowledge that emerge in the training process. This integration favors a broader and more contextualized understanding of the competence and contributes to its relevance, sustainability, and critical application in open educational environments.

In line with this, the results evidence what was pointed out by Veytia *et al.* (2023), who maintain

that the appropriation of digital knowledge is not limited to access to technologies but requires critical and reflective use. The developed experience confirms that the incorporation of the ethical-legal dimension into the model enhances the conscious reuse of open educational resources, validating that university teacher training should be oriented towards the construction of competencies that integrate technological knowledge with social and academic responsibility.

To guide the training process towards the development of the competence to reuse open educational resources in university professors, it is essential to delimit the epistemic foundations that support the proposed pedagogical strategy. This is built from a dialectical-materialist conception of knowledge, which recognizes the unity between the cognitive, the practical, and the ethical in teacher training.

In correspondence with this vision, the systemic-structural paradigm is assumed as a reference framework to integrally address the actors, processes, and contexts involved in the formation of digital competencies in open educational environments. This theoretical basis allows understanding the reuse of open educational resources not as an isolated technical action, but as a situated, reflective, and transformative practice, which demands the conscious articulation of pedagogical, technological, disciplinary, and ethical-legal knowledge in university teaching practice.

The theoretical references that support this research are enunciated from philosophical, pedagogical, didactic, sociological, psychological, and technological approaches. They allow grounding the training process of the university professor in the competence to reuse open educational resources, showing that it is a complex, situated process aimed at transforming educational practice.

From the philosophical perspective, the materialist-dialectical and historical method is assumed based on its laws, principles, categorical system, and as a universal manifestation of the scientific method, which allows interpreting and describing the stages that structure the proposed strategy. It makes it possible to understand how teaching practice is configured and transformed around the competence to reuse open educational resources. In this sense, the law of the transition from quantitative to qualitative changes allows explaining how the progressive accumulation of technical knowledge on the use and adaptation of open educational resources generates a qualitative leap in teaching performance.

The teacher stops being a passive consumer of digital content to become a critical reader, capable of selecting, contextualizing, and enriching resources based on the needs of their students and the institutional environment. This transformation does not occur spontaneously, but as a result of an intentional training process where the proposed pedagogical strategy acts as a mediator between knowledge and teaching action.

From the pedagogical perspective, the proposal is based on competency-based training (Tobón, 2013). In this framework, digital teaching competence (Cabero-Almenara *et al.*, 2020) constitutes an essential axis since it trains the university professor to select, adapt, and reuse open

educational resources critically and contextually. Teaching practice, conceived as a space for training and reflection (Castellanos Simons, 1999; Addine, 2002), is recognized here as the scenario where the teacher transforms theory into action, re-signifies resources, and generates meaningful learning in their students. Furthermore, professional development is conceived as a pedagogical process in which knowledge is socially constructed and reconstructed, favoring the continuous and relevant improvement of teaching performance (Bernaza Rodríguez *et al.*, 2018). In this sense, the reuse of open educational resources becomes a practice that not only strengthens digital competence but also drives pedagogical innovation and critical reflection on the university teaching function.

From the didactic perspective, the strategy assumes the principles that conceive teaching as an active, reflective, and socially situated process. Activity (Leontiev, 1978) is recognized as an important category, since the university teacher is not a passive receiver of resources, but a subject who acts, transforms, and creates new learning conditions from them. Pedagogical communication (Vygotsky, 1995; Danilov & Skatkin, 1978) is another category to consider, since knowledge is built through dialogue and mediation, which gives the reuse of resources a social and collaborative character.

On the sociological level, the assumptions of the information and knowledge society are considered (UNESCO, 2005), which perceive information as a public good, knowledge as a shared social construction, and technologies as an essential support. Likewise, distance postgraduate education is recognized as a social process that involves subjects with a specific function and responds to principles of flexibility, interaction, and communication.

From psychology, Ausubel's Theory of Meaningful Learning (1963, as cited in Rodríguez Palmero, 2008) is revisited, which explains how new knowledge is incorporated into the subject's cognitive structure when related to prior knowledge, which enables the understanding and meaningful appropriation of the competence to reuse open educational resources. Added to this is the historical-cultural approach of Vygotsky (1995) with the notion of the zone of proximal development (ZPD), which highlights the importance of social interaction and pedagogical mediation in the collective construction of knowledge.

The concept of mediation, conceived as a dialectical relationship between subject and object, allows us to understand that open educational resources and digital technologies act as sociocultural instruments that facilitate the transformation of knowledge and the formation of new competencies. In this sense, social mediation, pedagogical scaffolding, and contextualization become indispensable conditions for meaningful and sustainable learning.

The principles of Open Education regarding open educational resources are assumed (UNESCO, 2019), which maintain that knowledge should be free and accessible for use and reuse in diverse contexts. This conception implies that open educational resources are not conceived as static products, but as dynamic resources that can be adapted, reworked, and shared, favoring the democratization of knowledge and equity in access to education.

Under this perspective, collaboration in the construction and reworking of knowledge is promoted and facilitated, recognizing the value of collective work and the active participation of educational actors. Teachers, in their teaching function, when reusing a resource, not only integrate it into their practice but also enrich it with examples, adaptations, and contributions that respond to the needs of their students and the institutional context. Likewise, communities of practice are highlighted as privileged spaces for pedagogical innovation, where interaction, exchange of experiences, and shared creation of knowledge contribute to the improvement of teaching and the strengthening of the open access culture in higher education.

Finally, from an educational technology perspective, the use of Moodle is assumed as a techno-pedagogical environment that favors asynchronous interaction, formative assessment, and personalized learning (Rivero Padrón *et al.*, 2020). Likewise, the instructional design proposal of Legañoa Ferra (2024) is considered, which articulates curricular, technological, and pedagogical components from a systemic vision oriented towards the achievement of competencies in virtual environments. This proposal starts from the identification of training needs, didactic sequence, technological mediation, and formative assessment, consolidating an integral framework for teacher training in the reuse of open educational resources.

The strategy is characterized as contextualized, flexible, and systemic, recognizing the particularities of the institutional and professional environment, dynamically adapting to the needs of the university professor, and coherently articulating its structural and operational components. But it is distinguished, above all, by its theoretical-practical articulation and the connection of diverse knowledge, integrating conceptual contributions and local experiences and global approaches into a unique scientific result. This integration favors the transition from conceptual appropriation to the critical and transformative use of open educational resources, also enhancing the affective, cognitive, and attitudinal development of the university professor.

The pedagogical strategy is conceived as a systemic process that integrates three components: theoretical, methodological, and practical. Its essence lies in transforming the real state of teaching practice towards a desired state, through actions that guarantee the critical, ethical, and contextualized appropriation of the competence. According to the above, contextualization constitutes an essential principle in university teacher training. Only in this way is the relevance and sustainability of the training process guaranteed, as has been evidenced in recent research on teacher professional development (Martín *et al.*, 2023).

The theoretical significance of the pedagogical strategy is based on the critical articulation between knowledge and know-how, which allows transcending the mere accumulation of conceptual information towards its situated mobilization in university teaching practice. In this sense, the theoretical component constitutes the guiding axis of the proposal, systematizing epistemological references and training models that legitimize the competence to reuse open educational resources.

The theoretical contribution of the strategy is expressed in the expansion of the TPACK model

(Mishra and Koehler, 2006), by incorporating ethical-legal knowledge (ELK) as a fourth component alongside disciplinary (CK), pedagogical (PK), and technological (TK) knowledge. This contribution evidences the urgency of integrating ethics as a transversal dimension for a critical and responsible teaching practice, which confirms what was pointed out by Balladares-Burgos & Valverde-Berrocoso (2022) when recognizing the need to adapt the model to contemporary challenges, including ethical dilemmas in digital environments.

Thus, the ethics and legality of reusing open educational resources cease to be a contextual factor to become a specific and transversal knowledge, essential in teacher training. From the intersections between CK, PK, TK, and ELK, applied knowledge emerges that contextualizes the competence to reuse open educational resources. This knowledge allows the university professor to discern the quality and reliability of resources (CK+ELK), design inclusive and accessible practices that enhance interaction and collaborative learning (PK+ELK), and select technological tools that respect privacy and open standards (TK+ELK).

Together, the knowledge derived from these intersections constitutes critical and situated capacities that guide decision-making, favor the adaptation of resources to specific contexts, and promote an ethical and transformative use of open educational resources. In summary, the pedagogical strategy is supported by conceptual and methodological bases that ensure coherence between theory and practice, integrating disciplinary, pedagogical, technological, and ethical-legal knowledge into a dynamic system that strengthens the integral formation of the university professor as an agent of change in open education.

The methodological component constitutes the organizing nucleus of the strategy, defining its mission, general objective, stages, and methodological guidelines. It is structured into four moments: diagnosis and sensitization, planning, execution, and evaluation. Below, the methodological guidelines are presented, understood as the methodological concretion of the logic that underpins the strategy.

- Diagnosis and sensitization: Application of observation instruments in virtual environments, interviews, and surveys of professors and administrators, together with institutional sensitization activities that favor the initial characterization and collective construction of transformation forecasts.
- Planning: Theoretical and methodological preparation of teachers through teaching-methodological activities; definition of the roles of the actors (teacher, student, coordinator); scheduling of a blended professional development course supported by Moodle; incorporation of active learning methods (projects, case studies, collaborative learning); and conducting methodological visits for assistance, verification, and control.
- Execution: Active participation of teachers in forums, debates, and collaborative activities; motivation and guidance of students; assessment of their level of

collaboration; continuous monitoring of tasks; and creation of interaction spaces that combine individual and collective work, with emphasis on respectful communication and shared knowledge construction.

- **Evaluation:** Comparison between the initial diagnosis and the results achieved; assessment of achievements and shortcomings; constant feedback for continuous improvement; and use of verifiable evidence integrated into each action, ensuring timely decision-making and the sustainability of the strategy.

The practical component of the strategy materializes the actions planned in its four stages, ensuring that it does not remain only on a conceptual level but is translated into real training experiences. For its implementation, a professional development course is adopted as the fundamental organizational form, in correspondence with the provisions of current regulations for postgraduate education in Cuba, which guide this type of training for university professors. This course is developed on the Moodle platform, which makes it possible to manage, accompany, and systematize the training process effectively.

In this regard, the authors of this research share the criterion of Cabrales Fuentes (2025), who considers that postgraduate education stands as a fundamental pillar for social and professional advancement, by providing continuous updating opportunities that allow individuals and communities to integrate and sustain themselves in the working world. On the other hand, the results obtained in the pedagogical strategy are articulated with evidence from previous research: Quispe-Mamani *et al.* (2024) and Moya Gómez (2024) demonstrate that the use of collaborative platforms in virtual environments strengthens competencies such as critical thinking and autonomy, aspects that are corroborated in the developed experience.

Consequently, the study by Barén Vences *et al.* (2023) confirms that Moodle constitutes an essential support in postgraduate education, by facilitating the virtualization of training processes and promoting teacher-student interaction. In this sense, the proposed strategy shows that a professional development course using Moodle enhances the formation of professional competencies, which allows validating the effectiveness of collaborative platforms in postgraduate education.

Conclusions

The theoretical and methodological foundations of the pedagogical strategy for the formation of the competence to reuse open educational resources in university professors demonstrate its scientific and practical relevance. They provide a conceptual framework that articulates principles of innovation, collaboration, and sustainability to guide teaching practice towards the critical and responsible integration of open educational resources in higher education.

The integration of the ethical-legal component into the TPACK model guides teaching practice towards sustainability and transparency. Each stage of the pedagogical strategy is accompanied by specific guidelines that ensure coherence, active participation, and constant evaluation of the

training process.

Its integrative nature makes it possible to analyze the results from the perspective of theoretical relevance and methodological effectiveness, consolidating a proposal that responds to the current demands of Cuban higher education.

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Statement of author responsibility:

Oderay Molina Castellanos: Contributed the methodological design of the research, applied the methods, systematized, interpreted, and wrote the results.

Bárbara M. Carvajal Hernández: Collaborated in the elaboration of the methodological design of the research, the selection of methods, reviewed and corrected the final writing of the article.

Ognara García García: Participated in the methodological design of the research and in the interpretation and writing of the results.

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