Public higher education as the knowledge industry: An activity-theoretical proposal for veterinary, animal, and health sciences

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Abstract

This article proposes public higher education as an "industry of knowledge" understood not as a market analogue but as a socially organized, democratically accountable form of collective work that produces knowledge objects and develops the human capacities required to satisfy shared needs. Using cultural-historical activity theory, the university is modeled as an activity system oriented to transforming modes of life through the satisfaction chain of mode of life, need, object, want, motive, and activity. The proposal emphasizes the development of activity-system elements rather than the exclusive optimization of products: the collective subject, the object, and the community, mediated by tools, a persuasion tool, and a cooperative division of labor. In veterinary medicine, animal husbandry, and health sciences, this model reframes professional and research formation as a developmental project that strengthens communicative, transformative, and evaluative competence while cultivating socialization, individuation, and personhood. The paper articulates ethical constraints on persuasion, foregrounds instrumental genesis and catachresis in tool development, and specifies how knowledge objects such as definitions, descriptions, explanations, justifications, and narratives become actionable contributions to material, psychological, and spiritual dimensions of need. Implications are offered for curriculum design, internships, research training, and community-engaged knowledge governance.

Keywords: activity theory, higher education, veterinary education, knowledge production, instrumental genesis.

Educação superior pública como a indústria do conhecimento: uma proposta teórica baseada na teoria da atividade para as ciências veterinárias, animais e da saúde

Resumo

Este artigo propõe o ensino superior público como uma "indústria do conhecimento", entendida não como um análogo do mercado, mas como uma forma de trabalho coletivo socialmente organizada e democraticamente responsável, que produz objetos de conhecimento e desenvolve as capacidades humanas necessárias para satisfazer necessidades comuns. Utilizando a teoria da atividade histórico-cultural, a universidade é modelada como um sistema de atividades orientado para a transformação dos modos de vida através da cadeia de satisfação do modo de vida, necessidade, objeto, desejo, motivo e atividade. A proposta enfatiza o desenvolvimento de elementos do sistema de atividades, em vez da otimização exclusiva de produtos: o sujeito coletivo, o objeto e a comunidade, mediados por ferramentas, uma ferramenta de persuasão e uma divisão cooperativa do trabalho. Na medicina veterinária, na pecuária e nas ciências da saúde, esse modelo reformula a formação profissional e de pesquisa como um projeto de desenvolvimento que fortalece a competência comunicativa, transformadora e avaliativa, ao mesmo tempo em que cultiva a socialização, a individuação e a personalidade. O artigo articula

restrições éticas à persuasão, destaca a gênese instrumental e a catacrese no desenvolvimento de ferramentas e especifica como objetos de conhecimento, tais como definições, descrições, explicações, justificativas e narrativas, tornam-se contribuições acionáveis para as dimensões materiais, psicológicas e espirituais da necessidade. São apresentadas implicações para a elaboração de currículos, estágios, formação em pesquisa e governança do conhecimento envolvendo a comunidade.

Palavras-chave: teoria da atividade, ensino superior, educação veterinária, produção de conhecimento, gênese instrumental.

1. Introduction

Public higher education is commonly described through metaphors of service provision, credentialing, labor-market supply, innovation pipelines, or knowledge economies. Each metaphor highlights a real function, yet each can also narrow the institutional horizon to throughput and competitive performance. This article proposes a different framing: public higher education as the industry of knowledge, meaning a durable, collective, socially mandated organization of work devoted to producing knowledge objects and cultivating the capacities that enable communities to satisfy historically formed needs. The term "industry" is used in its older and broader sense of organized productive activity, not as a synonym for capitalist enterprise. The central claim is that the university's object is not exhausted by the production of outputs such as degrees, papers, or patents. Its object also includes the development of the central and mediating elements of the activity system through which those outputs become possible and socially meaningful. Thus, this knowledge industry will not be driven by profit but by the development of individuals and communities, serving the vast majority rather than corporations or the rich.

The argument is elaborated using cultural-historical activity theory (CHAT). Activity theory offers a way to model how institutions organize collective work around shared objects, how mediation shapes agency, and how contradictions drive development and redesign. Expansive learning research further supports the view that the object of activity is not fixed. That development includes transformations in the object, the participants, and the mediational means that coordinate work (Engeström, 2001; Postholm, 2020). This aligns with a democratic vision of public higher education as a public good: an institution accountable to communities, oriented to welfare and sustainable modes of life, and governed by inclusive participation rather than by market discipline alone (UNESCO, 1998).

The paper applies this analysis to the formation of veterinarians, animal scientists, and other health professionals, as well as to the formation of researchers in these fields. These professions are uniquely positioned because they explicitly intervene in modes of life across species: companion-animal households, productive systems, and wildlife and conservation contexts. In such domains, the "knowledge industry" must be simultaneously scientific, ethical, communicative, and practically transformative.

2. Theoretical framework

2.1 Activity theory and the university as collective work

Activity theory conceptualizes human conduct as object-oriented, mediated, and socially organized. Activity is distinguished from action and operation, but the present article emphasizes a different distinction: between the product of activity and the development of the activity system. In this view, development is not a byproduct of production; it is an explicit object of institutional design.

A key proposition in third-generation activity theory is that the minimal unit of analysis can be two interacting activity systems, which directs attention to boundary work, inter-organizational learning, and shared objects across institutions (Engeström, 2001; Postholm, 2020). This is particularly relevant for veterinary and health sciences because universities, clinics, farms, laboratories, public agencies, and communities co-produce welfare outcomes and knowledge.

2.2 Public higher education as a public good and as knowledge production

UNESCO's World Declaration on Higher Education grounds higher education in social responsibility, equity, and the development of knowledge and skills needed for societal development (UNESCO, 1998). The present argument treats this mandate as an activity-theoretical requirement: if the university is a public good, then the

object of its activity must be accountable to public needs, and the mediators of its work must be designed for inclusion, transparency, and collective agency.

At the same time, contemporary scholarship has described shifts in knowledge production toward more context-sensitive, socially distributed, and transdisciplinary arrangements. “Mode 2”–a context-driven, problem-focused, transdisciplinary research produced in heterogeneous networks, emphasizing application, reflexivity, social accountability, and quality control beyond traditional disciplinary institutions–accounts emphasize knowledge produced in the context of application, shaped by heterogeneous sites and actors (Gibbons et al., 1994; Nowotny et al., 2001). Activity theory adds a crucial refinement: these heterogeneous sites are not merely “stakeholders” but activity systems with partially shared, partially conflicting objects. Knowledge production, therefore, requires explicit mediational design to align objects without erasing contradictions.

2.3 Knowledge objects and the satisfaction chain

This model treats the “chain of satisfaction” as a cultural-historical sequence: mode of life shapes needs; needs become object-directed; wants articulate object selection; motives stabilize commitment; activity organizes production and transformation. The university, as a knowledge industry, specializes in producing knowledge objects that can enter this chain as mediational resources: definitions, descriptions, explanations, justifications, and narratives.

These forms are not interchangeable. Definitions stabilize coordination. Descriptions situate phenomena in context. Explanations support prediction and intervention. Justifications provide reasons for action and legitimation. Narratives integrate time, identity, and meaning, making complex histories intelligible and actionable (Bruner, 1991; Toulmin, 1958). In veterinary and health sciences, these knowledge objects circulate across laboratories, clinical encounters, farms, policy arenas, and public communication.

3. The activity-system model of the knowledge industry

This section specifies an activity system whose purpose includes not only production but also the development of each system element. The system includes three central elements and three mediators.

3.1 Central element 1: *The collective subject as an agent of collective intelligence*

The subject is collective: students, academic staff, clinicians, technicians, and research teams. The subject is modeled as an agent, meaning a capacity for intentional, accountable object-work, not merely an aggregation of individuals. Collective intelligence is treated as an emergent property of well-designed coordination that can exceed individual performance, as supported by empirical work on group intelligence (Woolley et al., 2010). Its ethical requirement is inclusion: the system must be designed so that diverse voices contribute to object construction rather than being reduced to symbolic participation.

This collective agent must also support socialization, individuation, and personhood. Socialization refers to entering historically formed practices and learning to participate competently. Individuation refers to developing distinctive capabilities and trajectories within collective work rather than against it. Personhood refers to becoming a responsible subject who can justify actions, assume obligations, and contribute to shared welfare. The development of personhood is not separable from the object of activity; it is formed in the very process of object-oriented work and its moral accountability (Stetsenko, 2017; Wenger, 1998).

3.2 Central element 2: The object as a welfare-oriented transformation of modes of life

The object is the socially shared problem-space that organizes activity. In this proposal, the object is explicitly welfare-oriented and democratic: it aims at improving human and animal welfare through the transformation and administration of modes of life. For veterinary medicine and animal husbandry, this includes household care practices, productive systems, and wildlife and conservation interventions. The object is not “animals” in the abstract but the historically situated relations among animals, humans, environments, and institutions.

The object must be built through a disciplined articulation of needs across three dimensions: material, psychological, and spiritual. The point is not to romanticize “spirituality” but to recognize that culture, hope, meaning, and transcendence are real orientations that organize motives and legitimate institutional action. Without

these, the knowledge industry collapses into technical servicing or into performance metrics detached from lived welfare.

3.3 Central element 3: The community as recipient and co-producer

The community is the recipient of the subject's work, but also a co-producer that shapes the object through demands, constraints, knowledge, and evaluation. In veterinary and health contexts, the community includes clients, producers, public agencies, local organizations, animal-care institutions, and the public.

For practical design, the community can be mapped by its typical stances toward the activity: supporters who provide resources and legitimacy; opponents who contest the object or means; resonators who amplify messages and practices; and indifferent actors whose non-participation still affects outcomes through inertia or absence. This typology is not moralistic. It is diagnostic: it clarifies which mediations are needed for cooperation and which contradictions must be addressed rather than suppressed.

4. Mediators and their developmental requirements

4.1 Mediator 1: *The tool as humanized material and as a developmental instrument*

Tools are material and symbolic artifacts through which subjects transform objects. From a Marxist-inflected activity perspective, the tool embodies humanization of material: it is nature reorganized by collective labor into durable capacities. Tools, therefore, carry histories of design decisions, labor relations, safety assumptions, and epistemic commitments. Instrumental genesis provides a further requirement: an artifact becomes an instrument only through use, as subjects develop utilization schemes and reshape artifacts to fit activity (Rabardel; Béguin, 2005). This process has pragmatic value. It enables reliable action, epistemic value because it shapes what can be known and measured, and heuristic value because it supports exploration and problem reformulation.

Tool development must also address catachresis, the creative and sometimes necessary misuse or repurposing of artifacts to meet local constraints. Catachresis is not merely an error; it can be a driver of innovation and a signal of mismatch between designed functions and real activity (Béguin, 2007). In veterinary and health sciences, catachresis often appears when practitioners improvise with available instruments under time pressure or resource scarcity. The institutional response should not be punitive by default. It should distinguish hazardous improvisation from legitimate adaptation and should redesign tools and training accordingly.

Finally, tool use reorganizes bodies and minds. Research on tool incorporation shows that tools can become integrated into body schema and action organization, indicating that tool-mediated work is also a form of developmental reconstitution of the subject (Maravita; Iriki, 2004). For professional formation, this supports a strong claim: tool training is also the shaping of perception, attention, and ethical responsibility.

4.2 Mediator 2: *The persuasion tool as ethical rhetoric and reciprocal transformation*

This educational model replaces "rules" with a persuasion tool. The replacement is not semantic. It shifts the mechanism of normativity from external compliance to mediated justification. A persuasion tool is a designed ensemble of communicative artifacts and practices through which a collective subject aligns with the community about what ought to be done, why it ought to be done, and how responsibility will be shared. It explicitly integrates ethos, logos, and pathos while excluding three distortions: emotional manipulation, scientism, and coercion.

Ethos is credibility grounded in competence and integrity. Logos is reason-giving that can be inspected, contested, and revised. Pathos is the legitimate recognition of affective orientation, including empathy and moral salience, without exploiting vulnerability (Aristotle, 2007; Perelman; Olbrechts-Tyteca, 1969; Petty; Cacioppo, 1986). This matters for veterinary and health sciences because persuasion is structurally unavoidable: clinicians and researchers must coordinate with clients, producers, institutions, and publics in contexts marked by uncertainty, risk, and value conflict.

The persuasion tool must also be reciprocal and reversible. Persuasion is not a one-way transmission from expert to layperson. The community's responses transform the subject's object, priorities, and self-understanding. This is consistent with communicative rationality and with democratic accountability: arguments must remain open to revision, and commitments must remain answerable to those affected by decisions (Habermas, 1984; UNESCO, 1998).

A further benefit of treating persuasion as a tool is that it can be developed through instrumental genesis. Students and researchers learn not only to "communicate" but to design, test, and revise persuasive artifacts, such as informed-consent materials, risk communication protocols, extension modules, community reports, shared decision-making scripts, and public evidence summaries. These artifacts have pragmatic value for coordination, epistemic value for clarifying uncertainty, and heuristic value for revealing contradictions that require institutional learning.

4.3 Mediator 3: The division of labor as cooperative coordination rather than domination

Division of labor coordinates specialized contributions. In capitalist enterprises, it often organizes domination, surveillance, and competitive individualism. A public knowledge industry must instead organize the division of labor for cooperation, inclusion, and shared responsibility. This does not require denying differences in expertise. It requires preventing expertise from becoming elitism and preventing hierarchy from becoming the default mechanism of coordination. For training and research, this implies that novices should be integrated into real object-work with graduated responsibility and explicit accountability, while the institution protects against predictable harms. Competence is recognized, but the recognition is tied to service, mentoring, and the cultivation of others' capacities.

5. Competence as a developmental outcome of activity-system participation

The proposal adopts a competence-oriented formation while resisting a reductive checklist mentality. Competence is interpreted as a developing capacity to participate in object-oriented collective work with accountability. Three competence dimensions organize curricular design. The communicative dimension concerns the capacity to produce and interpret knowledge objects and to engage in ethical persuasion. It includes communicative competence in professional genres and contexts, and it is crucial in veterinary practice where outcomes depend on veterinarian–client–patient communication (Canale; Swain, 1980; Hymes, 1972; Pun et al., 2020; Shaw et al., 2004).

The transformative dimension concerns the capacity to produce material and symbolic changes in the object. In veterinary and animal sciences, transformation includes clinical interventions, husbandry redesign, biosecurity routines, welfare improvements, and research-based innovations. It is inseparable from tool mastery and tool redesign through instrumental genesis (Béguin, 2007; Rabardel; Béguin, 2005).

The evaluative dimension concerns decision-making under uncertainty, including risk assessment, welfare judgments, and the justification of choices to others. It includes shared decision-making when legitimate options exist and when the values of affected parties must shape action (Stiggelbout et al., 2012). It also includes scientific evaluation in research, such as validity, reproducibility, and the responsible interpretation of evidence. A compact representation is provided in Table 1. The table is not a rigid classification; it is a curricular design aid that links competence to the production of knowledge objects and to the satisfaction of needs.

Table 1. Representation of competence dimensions, relating the dominant knowledge objects and their typical applications in veterinary and health sciences, with emphasis on communicative, transformative, and evaluative processes within professional and scientific contexts.

Competence dimension	**Dominant knowledge objects**	**Typical veterinary and health-science instantiations**
Communicative	Definitions, narratives, justifications	Client communication, extension education, public communication, consent and expectations
Transformative	Descriptions, explanations, procedures	Clinical interventions, husbandry redesign, laboratory protocols, tool development
Evaluative	Explanations, justifications, decision records	Differential diagnosis, welfare trade-offs, risk assessment, research appraisal

6. Application to veterinary, animal husbandry, and health-science formation

6.1 Undergraduate formation: entering object-work without reducing learning to compliance

Undergraduate training is conceptualized as entry into collective object-work with deliberate development of mediators. The student is not merely a recipient of instruction. The student becomes a junior participant in the knowledge industry, producing knowledge objects under supervision and learning to justify decisions ethically. Competency-based veterinary education initiatives provide an institutional anchor for outcomes-oriented design, but the present model adds an activity-theoretical requirement: outcomes must include the development of the activity system itself, including mediational redesign and community accountability (American Association of Veterinary Medical Colleges, 2025, 2026).

This has immediate curricular consequences. Communication training cannot be relegated to "soft skills." It becomes a core form of tool use: the persuasion tool mediates coordination with communities, transforms expectations, and prevents harm created by misunderstanding. Empirical work in veterinary communication supports this centrality (Pun et al., 2020; Shaw et al., 2004).

6.2 Internship and residency contexts: two interacting activity systems as the training unit

Clinical placements and field internships instantiate two interacting activity systems: the university and the host institution. Activity theory predicts that learning will be driven by contradictions across these systems, such as differences in resource constraints, risk tolerance, documentation practices, and welfare priorities (Engeström, 2001). The educational model, therefore, requires structured boundary mediations, including shared objects, common evaluation genres, and persuasion tools that align students, supervisors, clients, and institutional obligations.

6.3 Graduate formation and researcher development: knowledge objects as durable public contributions

Graduate students and early-career researchers are positioned as advanced participants whose work must be legible and usable beyond academic audiences. This requires explicit training in producing knowledge objects that travel: operational definitions, methodological descriptions, explanatory models, justificatory arguments for decisions and interpretations, and narratives that communicate significance and limitations responsibly (Bruner, 1991; Toulmin, 1958).

In a public knowledge industry, publication is not the final product but a mediational contribution that must enter community practice through extension, policy engagement, clinical translation, and open educational resources. This aligns with Mode 2 accounts of context-sensitive knowledge production while retaining the activity-theoretical emphasis on object negotiation and accountability (Gibbons et al., 1994; Nowotny et al., 2001).

7. Governance, evaluation, and democratic accountability

If higher education is a public knowledge industry, governance must support democratic participation in object definition and evaluation. The persuasion tool becomes central at the policy level as well: it structures deliberation, makes reasons explicit, and supports responsible adherence without coercion. Evaluation should therefore include, in addition to products, evidence of development in the activity system: improved mediational means, safer and more inclusive divisions of labor, increased community trust, and more adequate knowledge objects for real needs. This is not an argument against measurement. It is an argument for measuring what matters for welfare and for the sustainable reproduction of professional and research capacity.

8. Conclusions

This article proposed public higher education as the knowledge industry from an activity-theoretical perspective. The model reframes the university's object as a welfare-oriented transformation of modes of life through the satisfaction chain, using knowledge objects that travel into community practice. It asserts that the institution's purpose includes developing the activity system elements: the collective subject, the object, and the community, mediated by tools, a persuasion tool, and a cooperative division of labor.

Applied to veterinary medicine, animal husbandry, and health sciences, the proposal emphasizes competence as participation in accountable object-work, organized into communicative, transformative, and evaluative dimensions. Instrumental genesis and catachresis are treated as normal developmental dynamics in tool use, while the persuasion tool is treated as an ethical mediator that integrates ethos, logos, and pathos without manipulation, scientism, or coercion. The result is a coherent basis for curriculum, internship design, research formation, and institutional governance oriented to democratic community welfare.

9. Authors´ Contribution

Federico de la Colina Flores: planning, substantiation, and writing. *Heriberto Rodríguez Frausto*: planning, writing, editing, and management. *Paul Alexis de la Colina García*: review and style. *Tzitzi de Colina García*: review and style.

10. Conflict of Interest

No conflict of interest.

11. Ethics Approval

Not applicable.

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