From Philosophy to Practice: The UAZ Competency and Project-Based Model for Day-One Veterinary Readiness

Federico de la Colina Flores[1], Heriberto Rodríguez Frausto[2*], Tzitzi de la Colina García[3], Paul Alexis de la Colina García[4]

[1]Universidad Autónoma de Zacatecas. México. https://orcid.org/0000-0002-8890-2863
[2]Universidad Autónoma de Zacatecas. México. https://orcid.org/0000-0001-9608-5843
[3]Colegio Edison A.C. Guadalupe, Zac. México. https://orcid.org/0000-0001-8502-3903
[4]Colegio Edison A.C. Guadalupe, Zac. México. https://orcid.org/0009-0000-1666-1469

Abstract

Educational approach (UAZ Veterinary School): 1) Philosophy (why) this is the focus of the present article: form ethical, scientifically rigorous veterinarians who advance animal welfare, the public interest, and One Health; learning means producing artifacts that improve practice (protocols, dashboards, SOPs, briefs). 2) Policy (what we commit to) a competency-based curriculum with day-one readiness; clear ethics/welfare rules (3Rs); reproducible data and open-source tools; inclusion and accessibility; programmatic assessment and external advisory review. 3) Pedagogy (how learning works) activity- and project-based learning on real problems; evidence-based practice; deliberate skills practice with feedback; interprofessional teamwork; many observations that accumulate into defensible decisions. 4) Didactics (how courses are designed) backward design from competencies to products and activities; signature methods (case/simulation, field/lab studios, literate data analysis in Quarto); shared rubrics; robust scaffolds and templates. 5) Mechanics (day-to-day running) a weekly cadence (studio → methods lab → production sprint → review); version-controlled repos for every team; rapid narrative feedback plus automated checks; structured rotations; dashboards for progress; and continuous improvement via issues/PRs and change logs.

Keywords: Competency-based veterinary education, project-based learning, one health, cultural-historical activity theory (CHAT), collective intelligence, programmatic assessment

Educational Approach (UAZ Veterinary School)

Introduction

Contemporary veterinary education is increasingly expected to produce graduates who can transition safely and ethically into clinical and population-health practice from the first day of employment. Meeting this "day-one readiness" expectation requires more than enumerating competencies; it demands a coherent account of how professional identity, reasoning, and moral judgment are formed through socially organized practice. Cultural-historical and

activity-theoretical traditions emphasize that learners become professionals through mediated activity in systems of tools, rules, and communities, where emotions and motivations are themselves historically shaped and pedagogically consequential (Burkitt, 2021; Routh, Paramasivam, Cockcroft, Nadarajah, & Jeevaratnam, 2022; Roth, 2007; Engeström, 2014; Vygotsky, 1978; Wertsch, 1991). At the same time, modern veterinary work is increasingly team-based and data-intensive, making collective intelligence, distributed expertise, and accountable coordination central to diagnostic and therapeutic quality (McMillen & Levin, 2024; Mercier & Sperber, 2011; Page, 2007).

The Universidad Autónoma de Zacatecas (UAZ) Veterinary School has responded to these pressures by articulating an integrated, competency-based, activity- and project-based educational model oriented to producing practice-improving artifacts (e.g., protocols, dashboards, SOPs, briefs) and to sustaining continuous improvement through transparent, reproducible workflows. In this model, curriculum design is organized across five mutually reinforcing tiers philosophy, policy, pedagogy, didactics, and mechanics so that educational commitments (such as animal welfare, the public interest, and One Health) are translated into daily learning routines, assessment evidence, and team production cycles. The intended outcome is not only technical proficiency but also a form of professional flourishing in which students experience meaningful, purposeful engagement with authentic problems, consistent with accounts of well-being grounded in mastery and flow (Nakamura & Csikszentmihalyi, 2002).

This article develops the philosophical tier of the UAZ model by analyzing five foundational dimensions ontology, epistemology, rhetoric (as mediational reasoning), ethics, and aesthetics/well-being and showing how they materialize in veterinary and health-profession education. Drawing on Marxist and cultural-historical perspectives, contemporary argumentation theory, and work on emotion and collective intelligence, we propose that educational design must treat reasoning as rhetorically situated, ethically constrained, and practically mediated by artifacts that make norms actionable within communities (Marx & Engels, 1970; Burkitt, 2014; Aristotle, 2004; Rapp, 2002; Toulmin, 2003; Perelman & Olbrechts-Tyteca, 1969; van Eemeren & Grootendorst, 2004; Ilyenkov, 1977). By making these premises explicit, the paper provides a conceptual rationale for competency- and project-based training aimed at producing graduates who can coordinate evidence, values, and constraints to advance animal welfare and public health.

Philosophical Foundations of Veterinary and Health Education

Education for veterinarians, animal scientists, and health professionals' rests on deep philosophical premises about reality, knowledge, reasoning, morality, and well-being. We examine five core components:

1. **Ontology** – the nature of existence.

2. **epistemology** – knowledge generation.

3. **rhetoric** – mediational reasoning.

4. **ethics** – guide to morality – and

5. **aesthetics** – well-being) – and show how they materialize in education.

These are viewed through lenses such as Marxist theory, cultural-historical (activity) theory, purposive evolution, theories of emotion (as psychological tools and as social phenomena), and collective intelligence. For example, in cultural-historical psychology (inspired by Marx and Engels), humans are "not solely natural beings but primarily … social and historical beings" (Burkitt, 2021). This insight – that learners are shaped by history and society – underpins our analysis of how existential, cognitive, and affective dimensions intertwine in professional training.

Ontology and Existence

Ontology asks what kinds of beings populate the curriculum. In veterinary and health sciences the fundamental beings are living organisms – animals and humans – and we must ask *what does it mean* to exist as these beings. A Marxist ontology (dialectical materialism) holds that existence is rooted in material, productive conditions. Marx and Engels note that through labor humans have transformed the environment and become individuals "created through social and historical development" rather than by biology alone (Marx & Engels, 1970). In other words, professional identity is not just a natural trait but is formed by practice and society. An activity-theoretic ontology similarly emphasizes praxis: an "activity system" is composed of a subject using tools toward an object, all embedded in social rules (Routh et al., 2022). In a clinical or research setting, existence is mediated by instruments (scalpels, stethoscopes, databases), by protocols, and by communal goals (animal welfare, patient health). Emotions form part of being as well: from a cultural-historical view, "feelings and emotions… are every bit as much a cultural and historical product" as thinking (Burkitt, 2021). Thus who students and animals *are* includes learned emotional dispositions. Even collective intelligence recasts ontology: McMillen and Levin argue that life is a multiscale "nested" hierarchy in which "multiple components must work together to achieve specific outcomes," implementing collective intelligence from cells to organisms (McMillen & Levin, 2024). In this light, a veterinarian or health team is an emergent whole that cannot be reduced to isolated individuals. Finally, feminist-Marxist thinkers remind us that ontology must include reproduction and care: Federici stresses that capitalist society has relied on "unpaid labor… of women" in the household, a form of existence necessary to support the formal economy (Dean, 2020). A comprehensive ontological stance in education therefore recognizes people and animals as socially embedded, tool-mediated, emotional, and interdependent beings.

Epistemology and Knowledge Generation

Epistemology asks how knowledge is produced and justified. In the sciences of health and animal life, this concerns research methods, clinical reasoning, and ways of knowing nature. A Marxist epistemology cautions that knowledge is socially determined: it is influenced by class interests and ideology. Famously, "social being determines consciousness," not the other way around – meaning that scientific curricula and research priorities mirror economic and power relations. For instance, what we accept as veterinary "truth" can be shaped by industrial agriculture or pharmaceutical interests unless critically examined. Gramsci's notion

of hegemony further implies that dominant ideas (about health, animals, technology) pervade education unless countered by critical pedagogy.

By contrast, activity theory locates knowledge in practice. Learning is not passive absorption but arises in collective action. As Routh *et al.* explain, Engeström's *second-generation* activity theory frames learning as the "interactions of people, the tools they use and the rules within complex 'activity systems'" (Routh et al., 2022). In a veterinary clinic, knowledge (how to treat a case) emerges from the interplay of student and mentor, instruments (ultrasound, lab tests), and institutional protocols. Students "appropriate the social and cultural heritage" of the profession through such mediated activity. Emotions also color knowledge: theories of emotion (Holodynski, 2013; Ratner, 2000; Roth, 2007) (Ratner, Holodynski, Roth) treat feelings as psychological tools that guide attention and meaning. For example, a veterinarian's knowledge of animal pain includes empathetic insight, not just technical signs. Burkitt emphasizes that concepts are rooted in social relations: meaning and knowledge are 'products of relations between individuals' (Burkitt, 2014). This implies that epistemology in professional education must acknowledge the community context – knowledge is co-constructed in teams and cultures, not solely in the individual's mind.

Collective intelligence further expands epistemology: it sees knowledge as distributed across networks. Levin and colleagues show how, in biology, problem-solving is inherently collective: "each level [of organization] solves problems…requiring collective dynamics" (McMillen & Levin, 2024). Analogously, modern health research and practice rely on teams, databases, and collaborative platforms. Educating for this means teaching not only content but also the skills of collaboration, data sharing, and integrative thinking. Thus, epistemology in these fields blends Marxist critique (whose knowledge?) with activity-theoretic learning and a collective-intelligence perspective on knowledge creation.

Rhetoric as Mediational Reasoning

If this essay treats the educational model's philosophical tier as a theory of *how collective activity is coordinated*, then rhetoric is the broad practical art within which logic and reasoning operate. In classical terms, rhetoric is concerned with deliberation and judgment under conditions where demonstration is unavailable or incomplete precisely the ordinary condition of veterinary and animal-science practice, where uncertainty, values, and material constraints must be negotiated in real time. Aristotle's point that rhetoric is a counterpart of dialectic is important here: rhetorical proofs include the enthymeme (a "rhetorical syllogism"), meaning that inference is already internal to persuasion rather than external to it (Aristotle, 2004; Rapp, 2002). In this sense, *logos* is the inferential spine of a persuasive act, while *ethos* (credibility) and *pathos* (affectively salient orientation) are the conditions that make inferential reasons actionable within a community.

Contemporary argumentation theory strengthens this integration by treating reasoning as situated, audience-facing, and regulated by norms that are simultaneously logical and social. Toulmin's field-dependent model emphasizes that warrants, backing, and rebuttals are integral to the practical force of an argument, rather than decorative ornaments added after "real" reasoning is done (Toulmin, 2003). Perelman and Olbrechts-Tyteca frame

argumentation as securing adherence through reasons that are meaningful inside shared value structures; this makes explicit why veterinary judgments (welfare thresholds, acceptable risk, stewardship commitments) cannot be reduced to formal validity alone (Perelman & Olbrechts-Tyteca, 1969). Pragma-dialectics provides a critical safeguard: persuasion is legitimate when it can be reconstructed as a disciplined critical discussion in which standpoints remain open to challenge and reasons remain answerable to objections (van Eemeren & Grootendorst, 2004). Taken together, these approaches support a coherent thesis for the philosophical tier: rationality in professional education is rhetorical, because it is oriented to coordinating collective action by giving reasons that can withstand contestation.

This rhetorical conception aligns naturally with cultural-historical activity theory (CHAT). From a CHAT perspective, reason-giving is a form of mediated action: it is carried by cultural tools (concepts, genres, artifacts, platforms) that configure what counts as a relevant fact, an acceptable inference, and a legitimate decision (Engeström, 2014; Vygotsky, 1978; Wertsch, 1991). This is why, in the activity system proposed in the larger essay, substituting *rules* with *media* (tools to persuade) is not a retreat from normativity but a relocation of normativity into the mediational means by which norms become effective. Professional "rules" (legal constraints, welfare standards, clinic policies, biosecurity commitments) do not regulate practice as abstractions; they regulate practice insofar as they are instantiated in persuasive media: consent dialogues, risk visualizations, herd-health plans, audit genres, case presentations, and decision aids. In short, rhetoric is the practical infrastructure through which normativity travels.

Importantly, this view dissolves a common pedagogical mistake: treating emotion as an interference with reasoning. In CHAT-oriented accounts of work, affect is constitutive of orientation, attention, and readiness to act. Roth's study of workplace activity theorizes "emotional valence" as an internal reflection of organism–environment relations and connects affective coloration to practical reasoning in collective work (Roth, 2007). Burkitt's critique refines the point by insisting that emotions are historically formed within social relations and symbolically mediated activity, rather than being merely biological residues; the practical implication is the same for curriculum design: reasoning is *rhetorically* inseparable from how situations matter to participants (Burkitt, 2021). For veterinary education, this means students must learn to construct arguments that do not merely "contain correct facts," but that also recognize how urgency, empathy, moral injury, economic pressure, and trust shape what can be heard, questioned, and acted upon.

A rhetorical philosophy also accommodates dialectical reasoning without isolating it as a separate "type of logic." Dialectical logic, in Marxist traditions, treats contradiction as a driver of change in historically developing systems (Ilyenkov, 1977; Marx & Engels, 1970). In veterinary and animal sciences, recurring contradictions productivity versus welfare, antimicrobial stewardship versus short-term risk aversion, ecological constraints versus market imperatives are not occasional anomalies; they are structural tensions that require persuasive re-articulation of the object of activity. Rhetorically, dialectical reasoning becomes a capacity to (i) make contradictions visible, (ii) reframe them as shared problems rather than private failures, and (iii) propose syntheses that re-coordinate community action.

Finally, a rhetorical lens clarifies why "collective intelligence" is not simply many individuals adding their private reasoning. On argumentative accounts of cognition, human reasoning is strongly social: it is adapted for producing and evaluating arguments in interaction, thereby enabling coordination and correction through criticism (Mercier & Sperber, 2011). In institutional settings, the quality of group judgment depends on how diversity of perspectives is organized and made mutually accountable, not merely on assembling experts (Page, 2007). This is where "media" becomes a design variable: checklists, consensus routines, structured case conferences, and algorithmically aided aggregation can be treated as rhetorical technologies devices that shape what objections surface, which warrants count, and how decisions become collectively owned (with swarm-inspired coordination as one family of design metaphors) (Bonabeau, Dorigo, & Theraulaz, 1999). For an activity-theory-oriented educational model, the curricular aim is therefore to develop *rhetorical repertoires* genres and artifacts that embed logical accountability, ethical restraint, and audience attunement so that veterinary teams can transform contested situations into coordinated, welfare-relevant action.

Collective intelligence suggests another shift: group reasoning can follow patterns unlike individual logic. Teams can utilize "swarm" or algorithmic methods in diagnostics (e.g. consensus rounding) that surpass any single mind (Watson & Levin, 2023). Educators might model this by teaching checklists or collaborative diagnosis, harnessing group "intelligence" to avoid individual bias. In all, logical training in these professions is pluralistic: it teaches formal biomedical reasoning, dialectical critique, situational judgement, and collaborative problem-solving.

Ethics and Morality

Ethics in healthcare and veterinary fields is paramount. Professionals must learn codes of conduct (e.g. beneficence, animal welfare, public health) and develop moral sensibilities. Marxist ethics frames morality in terms of social justice: it demands that health and science serve the common good, not just profit. For instance, a Marxist-informed education would highlight the injustice of inaccessible care or the exploitation of marginalized communities (human or animal) for profit. Gramsci's insights imply that educators should cultivate *critical* consciousness so that students question the status quo (e.g. systemic biases in research funding or medical access).

Marxist-feminist Federici provides a powerful ethical critique: she emphasizes that unwaged reproductive work is invisible yet indispensable. As Federici notes, "unpaid labor… is a necessary support for waged labor" (Dean, 2020). In educational terms, this means curricula should acknowledge and value care and domestic dimensions of health – for example, recognizing that patient recovery often depends on nursing and home care. Ignoring these in education would perpetuate a skewed, patriarchal ethic.

Emotions and ethics are deeply entwined. Emotions act as *moral tools* – empathy, guilt, compassion guide ethical choices. Ratner describes emotions as psychological tools that enable self-regulation and social connection (Ratner, 2000). For instance, feeling compassion toward animals or patients informs ethical decisions (e.g. on euthanasia or treatment

priorities). Crucially, Burkitt highlights that emotions are *socially constituted* – they "are the product of relations between individuals" (Burkitt, 2014). This means moral emotions are learned in context: the empathy a vet feels is shaped by cultural narratives (e.g. stories of veterinarians acting with kindness) and by relationships with mentors and peers.

Finally, collective intelligence has ethical implications. Group decision-making in medicine raises issues of responsibility and consensus. Medical teams develop shared ethical norms (multidisciplinary case conferences create consensus on treatment plans). Educators should thus teach not only individual ethics but also the ethics of teamwork, interdependence, and shared intelligence. In sum, an ethical framework grounded in these philosophies combines social justice (Marxist), care and relations (feminist-Marxist), and community values (collective/social emotions) in preparing professionals who act morally in complex environments.

Aesthetics and Well-Being

"Aesthetics" here refers to notions of well-being, harmony, and flourishing in professional life. In health and veterinary practice, this translates to human and animal welfare, holistic health, and the joy of competent practice. A Marxist-inspired view would say that true well-being requires overcoming alienation: meaningful work, equitable societies, and care for nature create a "beautiful" life. Indeed, Marx anticipated that humans are happiest when labor is an expression of creativity, not mere survival. Applied to education, this means training should aspire not only to technical skill but to fulfillment – inculcating a sense that health work is a humane calling.

From an activity theory perspective, well-being arises when learners engage fully in purposeful activity (cf. Csikszentmihalyi's "flow" Nakamura & Csikszentmihalyi (Nakamura & Csikszentmihalyi, 2002)). A student who experiences authentic diagnosis or hands-on surgery (with guidance) can feel competent and satisfied. This aesthetic of mastery – the pleasure of making sense of complex problems – is an important educational aim. Emotions again play a role: positive emotional experiences in learning (encouragement, awe at nature's complexity) contribute to well-being, while negative experiences (burnout, desensitization) detract from it. Educators thus incorporate reflective practices and narratives that foster emotional health.

Burkitt's sociology of emotions suggests that well-being is social: our sense of flourishing depends on relationships and meanings. The emotional bonds among veterinary staff or medical teams – support networks, shared celebrations of success – are part of the aesthetic environment of the profession. Learning community values and rituals (white-coat ceremonies, interdisciplinary teams) contribute to a culture of well-being.

Collective intelligence also has an "aesthetic" dimension: it enables resilience. For example, when a hospital unit solves a crisis collectively, team members experience a sense of communal efficacy and purpose. On a societal level, "One Health" approaches (integrating human, animal, environmental health) embody a holistic aesthetic, promoting harmony across species. By integrating these perspectives, educators aim to cultivate not just competent graduates but professionals whose work promotes both scientific and human flourishing.

Conclusion

In sum, the philosophical foundations of veterinary, animal science, and health education must weave together multiple strands. Ontologically, learners are seen as social, tool-using, emotional beings whose work is embedded in nature and society (Burkitt, 2021; Routh et al., 2022). Epistemologically, knowledge is recognized as socially generated and practice-based, not merely transferred from book to brain. Logic and reasoning are taught as contextual and dialectical, acknowledging the role of emotion and collaboration (Burkitt, 2021; McMillen & Levin, 2024). Ethics is framed by social justice, relational care, and professional solidarity (Burkitt, 2014; Dean, 2020). Finally, aesthetics – conceived as well-being – reminds educators to foster meaningful, humane practice. By drawing on Marxist insights, activity theory, evolution-inspired teleology, emergent emotion theory, and collective intelligence, this integrated model equips professionals to understand *existence*, create *knowledge*, reason wisely, act morally, and promote *well-being* in their work. Each dimension reinforces the others, forming a coherent philosophical basis for educating veterinarians and health practitioners in the 21st century.

References

Burkitt, I. (2021). The emotions in cultural-historical activity theory: Personality, emotion and motivation in social relations and activity. Integrative Psychological and Behavioral Science, 55(4), 797-820. https://doi.org/10

Routh, J., Paramasivam, S. J., Cockcroft, P., Nadarajah, V., & Jeevaratnam, K. (2022). Using learning theories to develop a veterinary student preparedness toolkit for workplace clinical training. Frontiers in Veterinary Science, 9, 833034. https://doi.org/10

Nakamura, J., & Csikszentmihalyi, M. (2002). The concept of flow. In Snyder, C. R., & Lopez, S. J. (Eds.), Handbook of positive psychology (pp. 89-105). Oxford University Press.

Marx, K., & Engels, F. (1970). The german ideology. The german ideology. Progress Publishers.

McMillen, P., & Levin, M. (2024). Collective intelligence: A unifying concept for integrating biology across scales and substrates. Communications Biology, 7, 378. https://doi.org/10

Dean, J. (2020). Silvia federici: The exploitation of women and the development of capitalism [Internet]. Liberation School. Retrieved from https://www.liberationschool.org/silvia-federici-women-and-capitalism/.

Holodynski, M. (2013). The internalization theory of emotions: A cultural-historical approach to the development of emotions. Mind, Culture, and Activity, 20(1), 4-38. https://doi.org/10

Ratner, C. (2000). A cultural-psychological analysis of emotions. Culture & Psychology, 6(1), 5-39. https://doi.org/10

Roth, W. (2007). Emotion at work: A contribution to third-generation cultural-historical activity theory. Mind, Culture, and Activity, 14(1-2), 40-63. https://doi.org/10

Burkitt, I. (2014). Emotions and social relations. Emotions and social relations. SAGE Publications.

Aristotle (2004). Rhetoric. Rhetoric. Dover Publications.

Rapp, C. (2002). Aristotle's rhetoric. The Stanford Encyclopedia of Philosophy. Retrieved from https://plato.stanford.edu/entries/aristotle-rhetoric/

Toulmin, S. E. (2003). The uses of argument (Updated). The uses of argument (Updated). Cambridge University Press.

Perelman, C., & Olbrechts-Tyteca, L. (1969). The new rhetoric: A treatise on argumentation. The new rhetoric: A treatise on argumentation. University of Notre Dame Press.

van Eemeren, F. H., & Grootendorst, R. (2004). A systematic theory of argumentation: The pragma-dialectical approach. A systematic theory of argumentation: The pragma-dialectical approach. Cambridge University Press.

Engeström, Y. (2014). Learning by expanding: An activity-theoretical approach to developmental research (2nd ed.). Learning by expanding: An activity-theoretical approach to developmental research (2nd ed.). Cambridge University Press. https://doi.org/10

Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes (M. Mind in society: The development of higher psychological processes (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman, Eds.). Harvard University Press.

Wertsch, J. V. (1991). Voices of the mind: A sociocultural approach to mediated action. Voices of the mind: A sociocultural approach to mediated action. Harvard University Press.

Ilyenkov, E. V. (1977). Dialectical logic: Essays on its history and theory. Dialectical logic: Essays on its history and theory. Progress Publishers.

Mercier, H., & Sperber, D. (2011). Why do humans reason? Arguments for an argumentative theory. Behavioral and Brain Sciences, 34(2), 57-74. https://doi.org/10

Page, S. E. (2007). The difference: How the power of diversity creates better groups, firms, schools, and societies. The difference: How the power of diversity creates better groups, firms, schools, and societies. Princeton University Press.

Bonabeau, E., Dorigo, M., & Theraulaz, G. (1999). Swarm intelligence: From natural to artificial systems. Swarm intelligence: From natural to artificial systems. Oxford University Press.

Watson, R., & Levin, M. (2023). The collective intelligence of evolution and development. Collective Intelligence, 2(2), 26339137231168355.