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Competence without Competitiveness: Integrating Entrustable Professional Activities with Cultural–Historical Activity Theory for Veterinary, Animal, and Health Sciences

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Abstract

Competency-based education in veterinary, animal, and health sciences requires an approach that privileges competence and cooperation over competitiveness. This manuscript proposes and develops a scientific–philosophical model that synthesizes Entrustable Professional Activities (EPAs) with Cultural–Historical Activity Theory (CHAT) to support workplace-based learning across real settings such as clinics, farms, laboratories, slaughterhouses, and public-health agencies. The argument proceeds from the claim that learning ought to be oriented not only toward transforming objects improving welfare indices, reducing disease prevalence, strengthening data integrity but also toward forming subjects and communities capable of redesigning their tools, rules, and media. After reviewing key developments in the EPA literature and in CHAT, we articulate a method of conceptual integration that yields a coherent delegation grammar linked to activity-system analysis. We then narrate the supervision continuum in veterinary terms, exemplifying the five EPA supervision levels, including widely used expanded sublevels, in small-animal, equine, food-animal, public-health, and research contexts. A design for individualization is presented that draws on Self-Determination Theory, Cognitive Load Theory, Deliberate Practice, Desirable Difficulties, and Universal Design for Learning. Finally, we propose a programmatic, formative assessment approach grounded in activity-theoretical analysis, where diverse evidence streams are aggregated into fair, transparent entrustment decisions. The framework is suitable for students, educators, professionals, and researchers, and it is intended to be deployed in real workplaces rather than confined to classrooms.

Keywords: Entrustable professional activities, supervision levels, activity theory, veterinary education, workplace learning.

1. Introduction

This article addresses in traditional veterinary education models. Current academic approaches in veterinary training heavily emphasize lecture-based knowledge transmission, creating significant educational gaps due to the absence of theoretical frameworks for generating veterinary knowledge products. These products should naturally emerge from competency-

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based professional training programs in veterinary medicine and animal production. This review article draws upon activity theory principles, particularly those developed by Engeström, which views intentional action as tool-mediated activity directed toward specific objectives within comprehensive systems. These systems encompass subjects, rules, communities, labor division, tools and methods, and outcomes elements the authors consider fundamental to effective educational models. Additionally, the work incorporates Entrustable Professional Activities (EPAs) developed by Ole Ten Cate, which proposes experiential learning in authentic environments. In this model, advanced students integrate into communities of practice under expert supervision, developing competencies through progressive mentorship that transitions from direct observation to independent professional performance

Competency-based approaches in the health professions have evolved to ensure that graduates can act safely and ethically where living beings and livelihoods are at stake. In veterinary and animal sciences this entails organizing curricula around workplaces clinical services, farms and ranches, laboratory benches, abattoir lines, field epidemiology units, and regulatory offices rather than around classrooms alone. The guiding values of the present proposal are competence, cooperation, and public responsibility rather than competitive ranking. Learning is thus located within communities of practice, where shared objects of activity and public outcomes make progress visible. Advancement is paced by demonstrated readiness to assume responsibility for segments of real work, under a supervision structure that explicitly balances risk and growth. The paper aims to provide a publishable theoretical contribution that unifies two mature literatures EPAs and CHAT while offering concrete guidance for veterinary, animal, and health sciences.

2. Literature review

The EPA literature explains how units of professional work can be delegated once there is sufficient evidence to justify trust. EPAs operationalize broad competency frameworks by linking the safe execution of integrated tasks to levels of supervision that range from observation to independent practice and supervision of others. The literature also shows how entrustment may be either ad-hoc in the flow of work or summative through formal statements of awarded responsibility. Decisions are influenced by learner ability, integrity, reliability, and humility, by the supervisor's propensity to delegate, by task complexity and context, and by the supervisor–trainee relationship (Cate 2005, 2013, 2018; Cate et al. 2016; Cate, Schwartz, and Chen 2020). In veterinary education, the AAVMC's CBVE publications translate this logic into species-agnostic EPAs while EAEVE's Day One Competences define threshold outcomes that align with EPA specification (AAVMC Competency-Based Veterinary Education (CBVE) Working Group 2024, 2025; European Association of Establishments for Veterinary Education (EAEVE) 2024; Bok 2015).

CHAT provides a complementary lens that understands purposeful action as tool-mediated activity oriented to an object within a system comprising subject, rules, community, division of labor, tools and media, and outcomes. It reframes learning as expansive when communities collectively re-conceptualize their object and redesign their practices (Engeström 1987, 2001). Instrumental genesis names the co-evolution of artifacts and utilization schemes, while

boundary objects account for coordination across sites through artifacts that are locally adaptable yet cross-contextually robust (Vérillon and Rabardel 1995; Star and Griesemer 1989). Workplace learning research connects these ideas to clinical education and extramural placements (Dornan et al. 2007; Dornan 2012; Cashman et al. 2023). In parallel, literature on learner variability supplies design principles that reliably improve effectiveness: autonomy, competence, and relatedness support motivation; cognitive load must be managed through sequencing and scaffold fading; repetition with tight feedback drives expertise; spacing, interleaving, and retrieval practice strengthen retention; and universal design reduces barriers through multiple means of engagement, representation, and expression (Ryan and Deci 2000, 2020; Sweller, Merriënboer, and Paas 1998; Ericsson, Krampe, and Tesch-Römer 1993; Dunlosky et al. 2013; Kinsey et al. 2022; CAST 2018, 2024). Finally, psychological safety research, along with dialogic pedagogy, underwrites a non-authoritarian stance that protects welfare and public health while enabling learning (Edmondson 1999; McClintock et al. 2021; Freire 2000).

3. Methodology: conceptual integration and design

This is a theory-building and design-science manuscript. The method consists of an integrative review of the EPA and CHAT literatures and a constructive synthesis that yields a prescriptive framework for curriculum and assessment. The synthesis proceeds in three steps. First, we treat EPAs as a delegation grammar that specifies what can be entrusted and at which supervision level. Second, we analyze veterinary and animal-science work as activity systems in which subjects, objects, tools and media, rules, communities, divisions of labor, and outcomes form a dynamically coupled structure. Third, we iterate between the grammar and the structure to specify design moves, supervision expectations, and assessment strategies that jointly advance safety, learning, and community transformation. The approach is illustrated with discipline-specific exemplars in clinical, farm, laboratory, abattoir, public-health, and research settings. Because the paper aims at generalizable design principles rather than causal inference, the logic of validation is interpretive plausibility and use-value for educators and professionals.

4. Results: the integrated EPA–activity framework

The synthesis produces a framework in which EPAs are embedded within activity systems so that objects of work drive curriculum and assessment. Consider objects such as reducing bulk-tank somatic cell counts in a dairy herd, improving perioperative pain control in small animals, validating a PCR assay for a zoonotic agent, or raising hygiene scores along a slaughter line. Each object implies a configuration of tools and media including machines, software, checklists, dashboards, and data models, along with rules that govern welfare, biosecurity, antimicrobial stewardship, ethics, and regulation. Communities include clinicians, technicians, producers, clients, laboratory staff, and public-health officials who divide labor and coordinate through briefings and debriefings. Within this structure, learners are entrusted with segments of work that match risk and readiness; they document how their actions transform tools, rules, and relationships; and they progressively assume responsibility under decreasing supervision.

Within the integrated framework the five supervision levels become a narrative arc rather than a checklist. At the observation stage, learners concentrate on language, norms, and safety. Under direct, proactive supervision they enact procedures with in-room coaching, shifting from worked examples to independent steps and structured reflection. Under indirect, reactive supervision they lead low-risk cases while supervisors remain immediately available, verify key decisions, and review outcomes promptly; decision logs and what-if debriefs support adaptive expertise. In unsupervised practice, with or without remote monitoring, learners own outcomes, reason explicitly about cost and risk, and use dashboards as boundary objects to sustain accountability across stakeholders. In the supervisory stage they teach, run briefs and debriefs, author or update SOPs, and model just-culture responses to error. This narrative is then instantiated in veterinary contexts: in small-animal anesthesia a learner may progress from observing induction, to performing under direct oversight, to maintaining ASA I–II cases with immediate backup, to independently discharging patients with next-day review; in equine practice the scaffold moves from observing lameness exams to placing IV catheters under supervision to triaging emergencies prior to referral; in food-animal practice the arc covers vaccination visits and parasitology control plans; in public health it includes surveillance interviews and outbreak team leadership; and in research it extends from observing PCR workflows to independently designing and executing a sampling plan with documented deviations and corrective actions (Cate 2018).

5. Individualization and non-authoritarian supervision

The integrated design respects learner variability by aligning supervision levels to autonomy support and competence calibration. Learning contracts articulate shared goals and choices of cases and contexts; expectations about supervision levels are made transparent so that autonomy is experienced as responsibility shared with a team. Frequent, specific, feed-forward feedback helps shape subsequent actions. Rotations and placements are designed to space practice, interleave species and problems, and normalize retrieval opportunities. Mentoring constellations that include clinicians, producers, technicians, and peers support relatedness. Universal design encourages multiple representations flowcharts, narrated videos, and concise text and multiple forms of expression such as client letters, SBAR handovers, or standard operating procedures. Psychological safety is cultivated through clear norms for check-backs, closed-loop communication, pre-briefs and debriefs, and just-culture handling of mishaps so that decreasing supervision coincides with heightened transparency and trust (Edmondson 1999; McClintock et al. 2021; Freire 2000; Cate et al. 2016).

6. Formative, programmatic assessment

A programmatic approach to assessment treats observations, products, and conversations as information for learning. EPA field notes record ad-hoc entrustment decisions and supervision levels with brief narratives about reasoning and risk. Direct observations use concise guides that emphasize key safety behaviors without fragmenting practice. Product evaluations attend to client-facing letters, herd-health protocols, research SOPs, and data analyses, explicitly asking how each artifact transformed the activity system. Entrustment-based discussions probe decisions under uncertainty by exploring alternatives and contingencies. Multi-source feedback solicits perspectives from technicians, producers, clients, and public-health partners so that

judgments do not depend on a single vantage point. Portfolios and dashboards operate as boundary objects that integrate evidence across contexts and make progress visible over time. A competence committee synthesizes evidence longitudinally to issue summative entrustment for specific EPAs when grounded trust has been established, with safeguards that include sampling across time and sites, calibration among supervisors, shared prose rubrics that describe safe performance at each supervision level, and attention to psychological safety and equity in access to cases and placements (Vleuten et al. 2012; Cate et al. 2016; Cate 2018; Star and Griesemer 1989).

7. Discussion

The proposed framework disciplines delegation and re-situates authority within transparent, dialogic practices. Rather than relying on competitive sorting, it articulates a path for increasingly consequential participation that is paced by trust, evidence, and risk. It aligns educational value with public value by organizing curricula around workplace objects whose improvement is publicly observable. Because the framework is explicitly design-scientific, its evaluation should focus on feasibility, acceptability, and impact on welfare, safety, and learner development. Limitations include the need for local adaptation of EPA sets, the resource demands of programmatic assessment, and the imperative to train supervisors in non-authoritarian coaching styles. Future work should include mixed-methods studies of implementation in veterinary schools and health agencies, analysis of equity impacts across species and placement types, and design-based research on dashboards and other boundary objects that sustain cross-site coherence.

8. Conclusion

Integrating EPAs with activity theory yields an approach that is at once practical and emancipatory. It makes delegation safe and intelligible, orients learning to public objects in real workplaces, recognizes the diversity of learners, and cultivates communities capable of transforming their tools, rules, and relationships. For veterinary and animal sciences, the result is a curriculum that begins and ends in the workplace and measures its success not only in competent individuals but in healthier animals, fairer teams, more resilient producers, and stronger public institutions.

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Author contributions

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Competing interests

The authors declare no competing interests.

Data availability

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Ethical statement

No human or animal subjects were involved in the generation of this manuscript.

References

1. AAVMC Competency-Based Veterinary Education (CBVE) Working Group. 2024. "CBVE Publication 2: Entrustable Professional Activities (EPAs)." Association of American Veterinary Medical Colleges. https://veteducator.org/wp-content/uploads/CBVE-Publication-2-EPAs-2024.pdf.
2. . 2025. "CBVE 2.0 – a Terminology and Planning Resource." Association of American Veterinary Medical Colleges. https://veteducator.org/wp-content/uploads/CBVE-2.0-A-Terminology-and-Planning-Resource.pdf.
3. Bok, Harold G. J. 2015. "Competency-Based Veterinary Education: An Integrative Approach to Learning and Assessment in the Clinical Workplace." *Perspectives on Medical Education* 4 (2): 86–89. https://doi.org/10.1007/s40037-015-0172-1.
4. Cashman, Denise et al. 2023. "Learning Through Clinical Extramural Studies: An Observational Study." *Veterinary Record Open* 10 (1): e56. https://pmc.ncbi.nlm.nih.gov/articles/PMC10250168/.
5. CAST. 2018. "Universal Design for Learning Guidelines Version 2.2." CAST. https://udlguidelines.cast.org/static/udlg2.2-text-a11y.pdf.
6. . 2024. "Universal Design for Learning Guidelines Version 3.0." CAST. https://udlguidelines.cast.org/more/downloads/.
7. Cate, Olle ten. 2005. "Entrustability of Professional Activities and Competency-Based Training." *Medical Education* 39 (12): 1176–77. https://doi.org/10.1111/j.1365-2929.2005.02341.x.
8. . 2013. "Nuts and Bolts of Entrustable Professional Activities." *Journal of Graduate Medical Education* 5 (1): 157–58. https://doi.org/10.4300/JGME-D-12-00380.1.
9. . 2018. "A Primer on Entrustable Professional Activities." *Perspectives on Medical Education* 7 (2): 75–85. https://doi.org/10.1007/s40037-018-0403-z.
10. Cate, Olle ten, David Hart, Felix Ankel, et al. 2016. "Entrustment Decision Making in Clinical Training." *Academic Medicine* 91 (2): 191–98. https://doi.org/10.1097/ACM.0000000000001044.
11. Cate, Olle ten, Alan Schwartz, and H. Carrie Chen. 2020. "Assessing Trainees and Making Entrustment Decisions: On the Nature and Use of Entrustment–Supervision Scales." *Academic Medicine* 95 (11): 1662–69. https://doi.org/10.1097/ACM.0000000000003427.
12. Dornan, Tim. 2012. "Workplace Learning." *Perspectives on Medical Education* 1 (1): 39–41. https://doi.org/10.1007/s40037-012-0005-4.
13. Dornan, Tim, Henny Boshuizen, Nigel King, and Albert Scherpbier. 2007. "Experience-Based Learning: A Model Linking the Processes and Outcomes of

Medical Students' Workplace Learning." *Medical Education* 41 (1): 84–91. https://doi.org/10.1111/j.1365-2929.2006.02652.x.

14. Dunlosky, John, Katherine A. Rawson, Elizabeth J. Marsh, Mitchell J. Nathan, and Daniel T. Willingham. 2013. "Improving Students' Learning with Effective Learning Techniques: Promising Directions from Cognitive and Educational Psychology." *Psychological Science in the Public Interest* 14 (1): 4–58. https://doi.org/10.1177/1529100612453266.
15. Edmondson, Amy C. 1999. "Psychological Safety and Learning Behavior in Work Teams." *Administrative Science Quarterly* 44 (2): 350–83. https://doi.org/10.2307/2666999.
16. Engeström, Yrjö. 1987. *Learning by Expanding: An Activity-Theoretical Approach to Developmental Research*. Helsinki: Orienta-Konsultit. https://monoskop.org/images/4/4b/Engestrom_Yrjo_Learning_by_Expanding.pdf.
17. . 2001. "Expansive Learning at Work: Toward an Activity-Theoretical Reconceptualization." *Journal of Education and Work* 14 (1): 133–56. https://doi.org/10.1080/13639080020028747.
18. Ericsson, K. Anders, Ralf Th. Krampe, and Clemens Tesch-Römer. 1993. "The Role of Deliberate Practice in the Acquisition of Expert Performance." *Psychological Review* 100 (3): 363–406. https://doi.org/10.1037/0033-295X.100.3.363.
19. European Association of Establishments for Veterinary Education (EAEVE). 2024. "Day One Competences (3.5)." EAEVE. https://www.eaeve.org/fileadmin/downloads/sop/SOP_2024/02-DayOneCompetences.pdf.
20. Freire, Paulo. 2000. *Pedagogy of the Oppressed*. 30th Anniversary. New York: Bloomsbury Academic.
21. Kinsey, H. et al. 2022. "Desirable Difficulty in Health Professions Education." *Medical Education Online* 27 (1): 2037063. https://pmc.ncbi.nlm.nih.gov/articles/PMC10107184/.
22. McClintock, Andrew et al. 2021. "Creating Psychological Safety in the Learning Environment." *Academic Medicine* 96 (11S): S64–70. https://doi.org/10.1097/ACM.0000000000004039.
23. Ryan, Richard M., and Edward L. Deci. 2000. "Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being." *American Psychologist* 55 (1): 68–78. https://doi.org/10.1037/0003-066X.55.1.68.
24. . 2020. "Intrinsic and Extrinsic Motivation from a Self-Determination Theory Perspective: Definitions, Theory, Practices, and Future Directions." *Contemporary Educational Psychology* 61: 101860. https://doi.org/10.1016/j.cedpsych.2020.101860.
25. Star, Susan Leigh, and James R. Griesemer. 1989. "Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907–39." *Social Studies of Science* 19 (3): 387–420. https://doi.org/10.1177/030631289019003001.
26. Sweller, John, J. J. G. van Merriënboer, and Fred G. W. C. Paas. 1998. "Cognitive Architecture and Instructional Design." *Educational Psychology Review* 10 (3): 251–96. https://doi.org/10.1023/A:1022193728205.

27. Vérillon, Pierre, and Pierre Rabardel. 1995. “Cognition and Artifacts: A Contribution to the Study of Thought in Relation to Instrumented Activity.” In *European Journal of Psychology of Education*, 10:77–101. 1. https://doi.org/10.1007/BF03172796.
28. Vleuten, C. P. M. van der, L. W. T. Schuwirth, E. W. Driessen, J. Dijkstra, D. Tigelaar, L. K. J. Baartman, and J. van Tartwijk. 2012. “A Model for Programmatic Assessment Fit for Purpose.” *Medical Teacher* 34 (3): 205–14. https://doi.org/10.3109/0142159X.2012.652239.