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CENTRAL AND PERIPHERAL ACTIONS IN A MODIFIED ACTIVITY SYSTEM: A TYPOLOGY FOR VETERINARY, ANIMAL-HUSBANDRY, AND HEALTH-SCIENCES EDUCATION AND RESEARCH

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ABSTRACT

This article develops a typology of actions for a modified cultural-historical activity system in which the classical "rules" node is replaced by a persuasion tool. Building from activity-theoretical accounts of the socio-economic cycle of activity and from the instrumental genesis tradition, we define two families of actions: central actions that reproduce the object of activity and peripheral actions that stabilize, legitimize, learn, and extend object-work. Central actions are Production, Persuasion, Distribution, and Utilization. Peripheral actions are Support, Commitment, Knowledge, Visibility, Access, and Participation. The typology is applied to veterinary medicine, animal husbandry, and adjacent health-science professions, showing how curricula, clinical training, and research programs can be designed and assessed as coordinated action systems. We argue that the typology provides a didactic and tactical scaffold for competency-based formation, including clinical service, herd-health production systems, One Health and One Welfare commitments, and research translation.

Keywords:*activity theory; action typology; instrumental genesis; persuasion tools; veterinary education; animal husbandry; knowledge translation*

INTRODUCTION

Educational models informed by cultural-historical activity theory typically differentiate the hierarchy of activity, actions, and operations. This paper focuses on the middle layer: actions as goal-directed units through which an activity is planned, coordinated, justified, executed, and evaluated. In professional formation, action-level design is the natural locus for didactics and tactics: what learners do, with whom, with which mediational means, and how the work is rendered meaningful, legitimate, and revisable.

We extend the activity-system framework by adopting a modified systemic topology where the element commonly labeled "rules" is replaced by a persuasion tool. This substitution is not cosmetic. In practice, "rules" in professional learning environments are enacted through mediational means: consent documents, protocols, briefs, case presentations, dashboards, reports, and other artifacts that carry logos justifications, ethos warrants, and pathos orientations. Under this view, normativity is operationalized through designed, appropriated, and contested tools. The paper's aim is to (i) define a typology of actions compatible with this modification, (ii) clarify how these actions connect the nodes of the system, and (iii) demonstrate their value for veterinary and animal-science education and research.

CONCEPTUAL BACKGROUND

Activity systems and the socio-economic cycle

Engeström's expanded model connects subject, object, tools, community, division of labor, and historically formed regulation. In his treatment of activity systems, the object is reproduced through a socio-economic cycle

often described as production, distribution, exchange, and consumption [1]. This cycle foregrounds the fact that object-work is not reducible to "doing tasks." It is sustained by allocation and coordination (distribution), communicational and relational mediation (exchange), and the uptake of outcomes in life and practice (consumption) [1].

Our modification retains the cycle's logic but renames and re-specifies two phases to fit educational design:

Exchange → Persuasion, to emphasize that coordination and legitimacy are enacted through designed persuasive artifacts and genres rather than as an abstract "rule-following" constraint.

Consumption → Utilization, to emphasize that outcomes become real in practice through uptake, appropriation, critique, and feedback, including research translation and service implementation.

Instrumental genesis and the humanization of tools

Instrumental genesis distinguishes the artifact from the instrument or tool: an artifact becomes an instrument only through processes by which subjects develop schemes of use and transform the artifact in use [2-3]. Design and learning therefore require attention to (i) the humanization of material or how tools condense and materialize human intentions, histories, and values, and (ii) the developmental coupling between subjects and artifacts.

A key implication for the persuasion tool is that it must be understood as a developing instrument: learners and communities do not merely "apply" persuasive formats; they appropriate them, adapt them to local contradictions, and sometimes repurpose them through catachresis, a rhetoric form to mean creative misuse and refunctioning [2, 4]. In health-profession education, this view aligns with the need to manage instrumental genesis through instructional configurations and orchestrations rather than leaving tool appropriation to chance [5].

Competency-based formation as organized action systems

Competency-based veterinary education emphasizes observable performance across authentic professional tasks, often framed through entrustment and workplace readiness [6]. The EPA approach similarly foregrounds integrated professional work, including communication, reasoning, documentation, and collaboration [7]. A typology of actions provides a complementary analytic layer: it decomposes integrated performance into recurring action families that can be intentionally taught, scaffolded, assessed, and redesigned.

METHOD AND SCOPE

This is a theory-building and design-oriented analysis. We (i) derive an action typology by combining the production–distribution–exchange–consumption cycle in activity theory with instrumental genesis assumptions about tool appropriation and development, (ii) specify each action by its functional connection among system elements, and (iii) illustrate each action with applications to veterinary clinical education, animal production and herd-health systems, and research training. The result is intended as a reusable schema for curriculum design, program evaluation, and learning-research integration.

A typology of actions for the modified activity system

Defining "action" in an activity system

An action is a goal-directed, socially situated unit of conduct that advances object-work under specific conditions by mobilizing mediational means. Actions are not isolated behaviors. They are oriented to the object, accountable to a community, shaped by division of labor, and stabilized through tools and genres. In education, action design is the primary didactic lever: it is where objectives, artifacts, roles, time, feedback, and evaluation are specified. **Fig.1,** shows our activity system diagram.

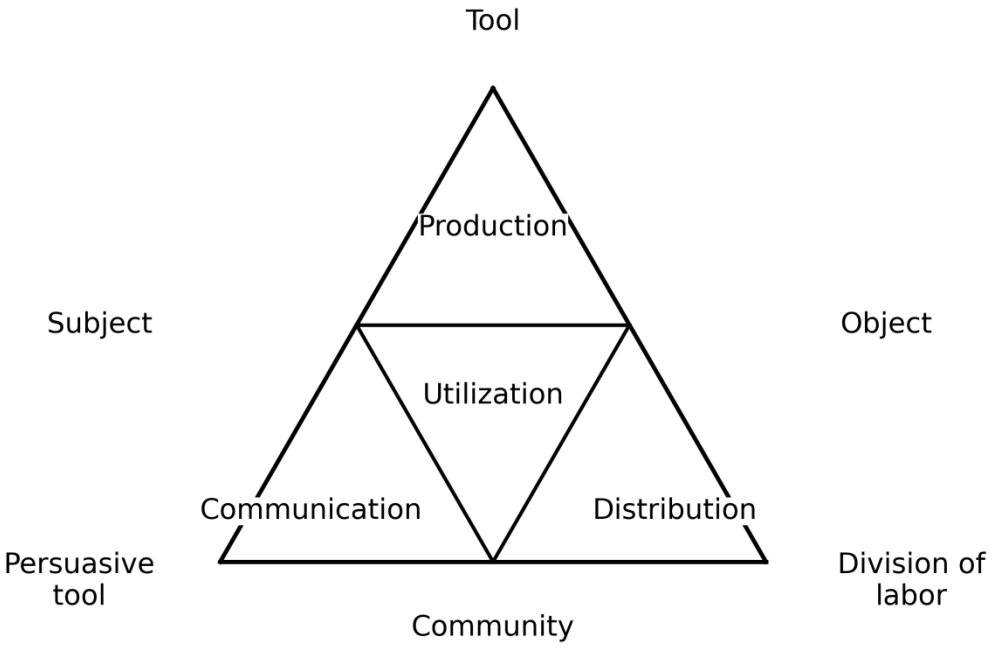

Figure 1*: Our activity system diagram, where the product element has been removed and the rules element has been substituted by the persuasive tool.*

CENTRAL ACTIONS

Central actions are necessary for the reproduction of the object and the continuity of the activity. They form a minimal cycle that allows the activity to exist as an organized, collective enterprise.

1. Production (Subject ↔ Object through tool)

Production connects the **subjec**t with the **object** through the **technical tool**. It is the action family in which work directly transforms the object or produces an artifact-service outcome.

Examples:

Veterinary clinical education: examination, diagnostic sampling, imaging, treatment planning, surgical procedures, nursing care using instruments and clinical protocols.

Animal husbandry: ration formulation, housing adjustments, reproductive management, biosecurity implementation, welfare assessment using measurement tools and farm technologies.

Research training: data collection, laboratory procedures, modeling, analysis pipelines producing datasets, models, or interventions.

Production is typically the most visible component of learning, but it depends on the other central actions to be legitimate, coordinated, and usable.

2. Persuasion (Subject ↔ Community through persuasion tool)

Persuasion connects the subject with the community through the persuasion tool. It is the action family that secures shared understanding, consent, trust, legitimacy, and coordinated commitment. It includes case presentations, client consultations, ethical justifications, stakeholder negotiation, and argument-based reasoning as communicational work.

Persuasion is not reducible to manipulation. In professional education it should be normatively constrained by welfare commitments and transparent reasoning, but operationally enacted through artifacts: consultation models, consent forms, risk briefs, evidence summaries, treatment rationales, and public-facing explanations.

Examples:

Small-animal practice: clinician and student build shared decisions with owners through structured consultation dialogue, written estimates, consent documentation, and explanation of uncertainty.

Livestock systems: negotiating herd-health interventions with producers, explaining trade-offs among welfare, productivity, and environmental constraints.

Research: grant proposals, preregistrations, ethics submissions, stakeholder engagement plans, dissemination briefs.

Veterinary education literature highlights the centrality of communication structure and consultation skills to professional performance [8].

3. Distribution (Community ↔ Object through division of labor)

Distribution connects the **community** with the **object** through the **division of labor**. It is the action family that allocates responsibility, resources, authority, and sequencing: who does what, when, with which access and accountability.

Distribution is not merely administrative. It is an epistemic and ethical structure: it decides which voices are included, how risk is managed, and how novices gain legitimate participation without compromising patient welfare.

Examples:

Teaching hospital: triage allocation, case assignment, supervisory structure, escalation protocols.

Field placements: matching students to farms, labs, shelters, zoos; specifying role boundaries; defining learning and service deliverables.

Research groups: task distribution across data management, wet lab, analysis, writing; authorship criteria; governance of shared resources.

4. Utilization (Community ↔ Subject and Object)

Utilization connects the **community** with both **subject** and **object** by putting outcomes to use in practice, revealing their adequacy, side effects, and developmental consequences. Utilization corresponds to the moment in which "the product" becomes a lived outcome: adopted, rejected, modified, or repurposed.

Utilization is distinct from production in three ways:

Outcome uptake: the community integrates the produced artifact-service into routines. For example, a treatment protocol becomes part of clinic practice, or a herd-health plan becomes embedded in farm management.

Feedback and contradiction surfacing: utilization exposes misfits among aims, constraints, and values. This is where contradictions become actionable for redesign.

Formation through consequences: the subject's professional identity and competence develop through experiencing how others use, contest, or depend on their work.

In research and health education, utilization is also the core of knowledge-to-action cycles and research use. Knowledge translation frameworks emphasize that producing knowledge is insufficient; uptake requires application cycles, adaptation, monitoring, and evaluation [9-10]. Utilization thus includes guideline implementation, audit and feedback, extension activities, and community-based adoption processes.

Examples:

Clinical education: the client implements a home-care plan; the clinic uses a student-generated discharge plan; follow-up outcomes reshape future case reasoning.

Animal production: the farm adopts a welfare enrichment plan; performance indicators and welfare markers feed back into redesign.

Research: an extension bulletin changes management practices; a diagnostic model is adopted in a lab; replication and external critique modify methods and claims.

PERIPHERAL ACTIONS

Peripheral actions are not "optional." They are enabling and developmental actions that stabilize central actions, reduce predictable failures, and expand the system's capacity. They often become central under conditions of crisis, innovation, or institutional change.

1. Support (Community ↔ Subject through tool)

Support connects community and subject through the technical tool infrastructure and scaffolding arrangements. Support actions include mentoring, maintenance, calibration, simulation, checklists, and learning resources that allow novices to act safely and progressively **(Fig. 2).**

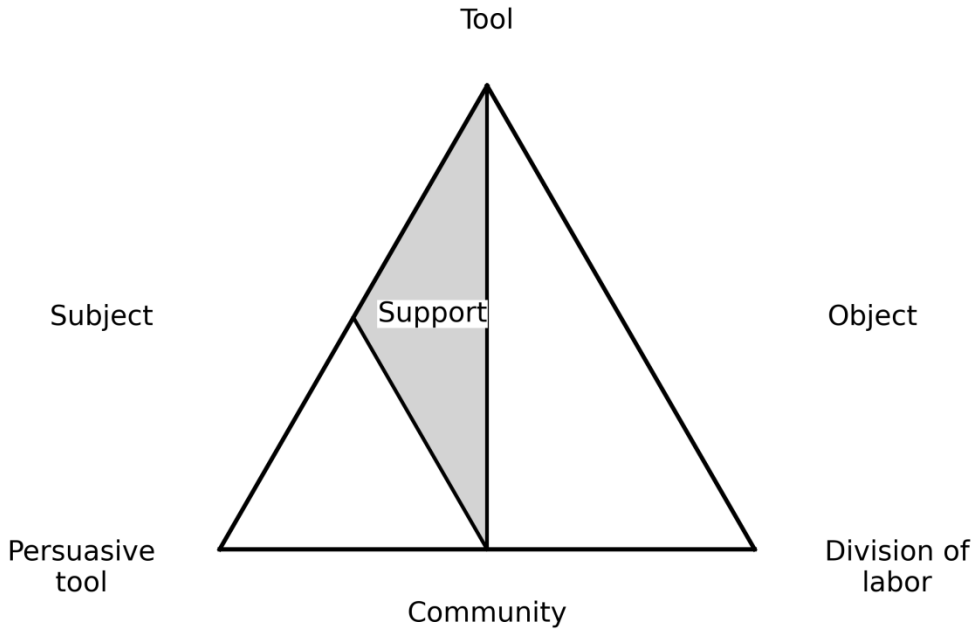

Fig. 2*: Support is the result of the community's actual provision of adequate tools to transform the object to fulfill the activity's motive, and it is this transformation that creates the desired outcome.*

In instrumental genesis terms, support organizes environments that assist appropriation, preventing tool use from degenerating into ritual or error. This facet allows setting a goal to request the necessary tools to transform the object and to evaluate the results of the efforts undertaken in this regard. Additionally, managing tool appropriation through instructional configurations is a known requirement in instrumented learning and development [5].

2. Commitment (Community ↔ Object through tool)

Commitment connects the community with the object through technical tools like binding artifacts and procedures: contracts, consent forms, memoranda of understanding, welfare charters, research agreements, and service standards. Commitment actions stabilize expectations and protect agent and patient subjects by making obligations explicit **(Fig. 3**). This.

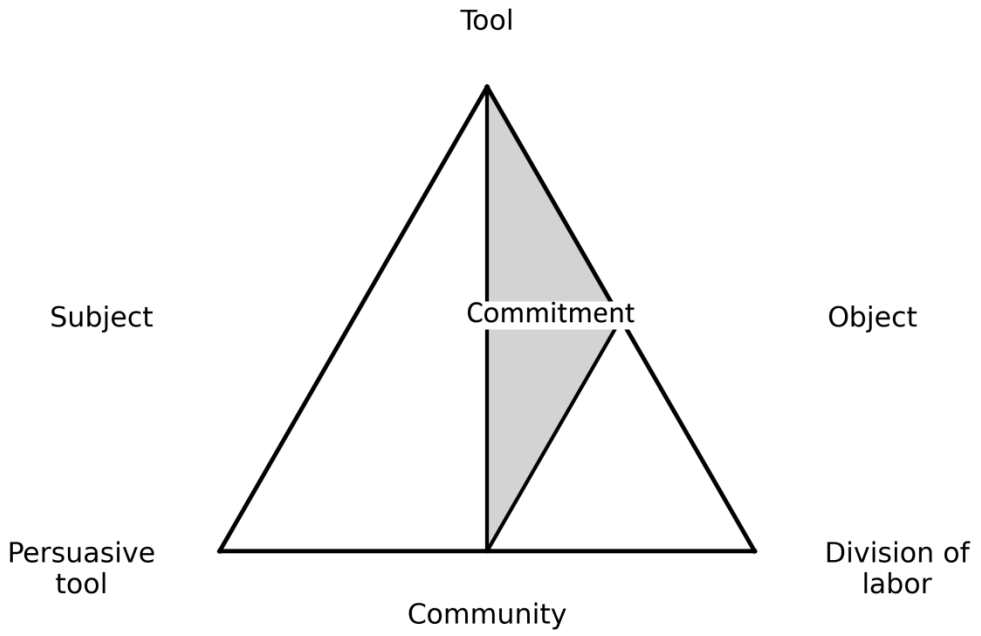

Fig. 3*: Commitment shows how far a community will go to transform an object to solve a need, and the activity that is supposed to satisfy such need.*

Social commitment involves political, ethical, and moral stances aimed at improving the quality of life for people, animals, and the environments in which they live. In One Welfare and One Health-oriented work, commitment must explicitly incorporate welfare goals across human–animal–environment interfaces [11].

3. Knowledge (Subject ↔ Object through persuasion tool)

Knowledge connects subject and object through the persuasion tool by generating and communicating action-guiding understanding. This includes evidence appraisal, reasoning transparency, diagnostic justification, and explicit uncertainty management.

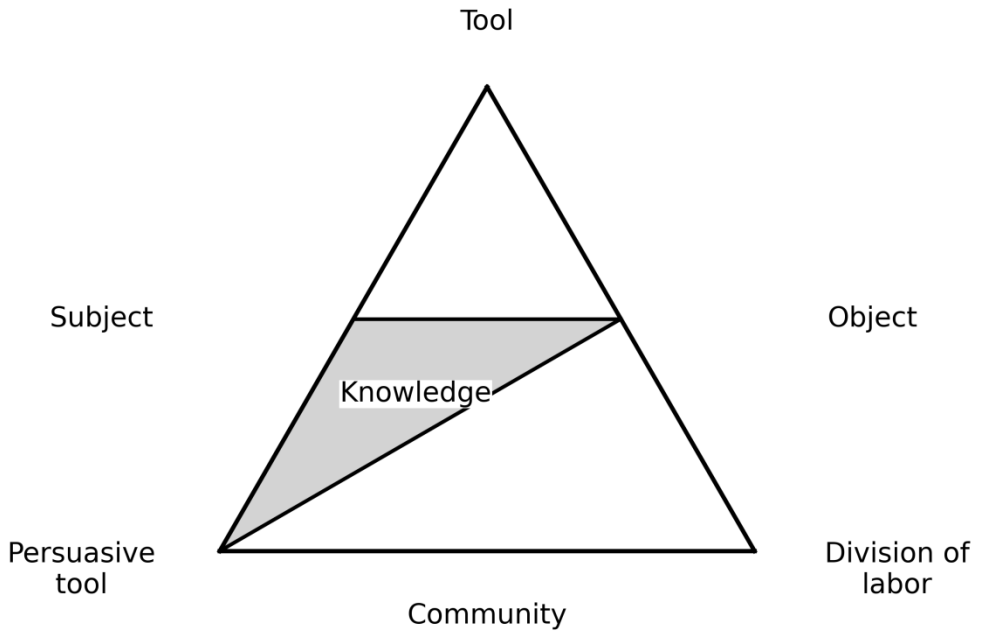

Fig. 4*: Our activity system diagram, where the product element has been removed and th rules element has been substituted by the persuasive tool.*

Various arrangements and combinations of objects of knowledge—definitions, descriptions, explanations, justifications, and narratives—serve as persuasive (psychological) tools for transforming minds, wills, and behaviors. Knowledge actions often take the form of written and oral genres: case rationales, structured abstracts, evidence summaries, and "explain your decision" routines. They mediate epistemic responsibility and make learning inspectable.

4. Visibility (Community ↔ Object through persuasion tool)

Visibility connects community and object through the pesruasion tools to render the object-work relationship transparent, auditable, and narratable. Visibility actions include dashboards, case logs, welfare reports, incident reports, public communication, posters, and publications.

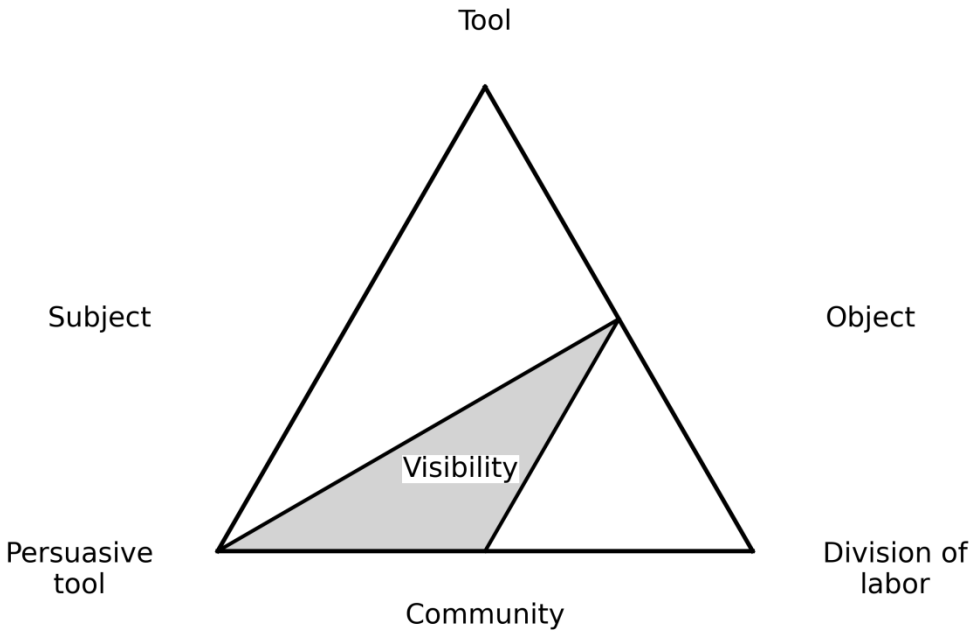

Fig. 5*: Visibility shows the presence of an object in what is said and published in scholarly literature and the media.*

The use of persuasive tools to inform the community about the object of an activity is the process of raising awareness. In this way, even the knowledge produced by dead people is available to the community. Visibility is essential for collective learning: it creates trace data for reflection, accountability, and redesign. It also enables ethical scrutiny, especially when animals are trained, displayed, or otherwise positioned as patient subjects in zoos or research contexts.

5. Access (Subject ↔ Object through division of labor)

Access connects subject to object through division of labor by granting permissions, rotations, role-based capabilities, and legitimate entry into tasks. Access is the developmental counterpart to distribution: it is how novices obtain safe, meaningful contact with the object and how expertise is gradually entrusted.

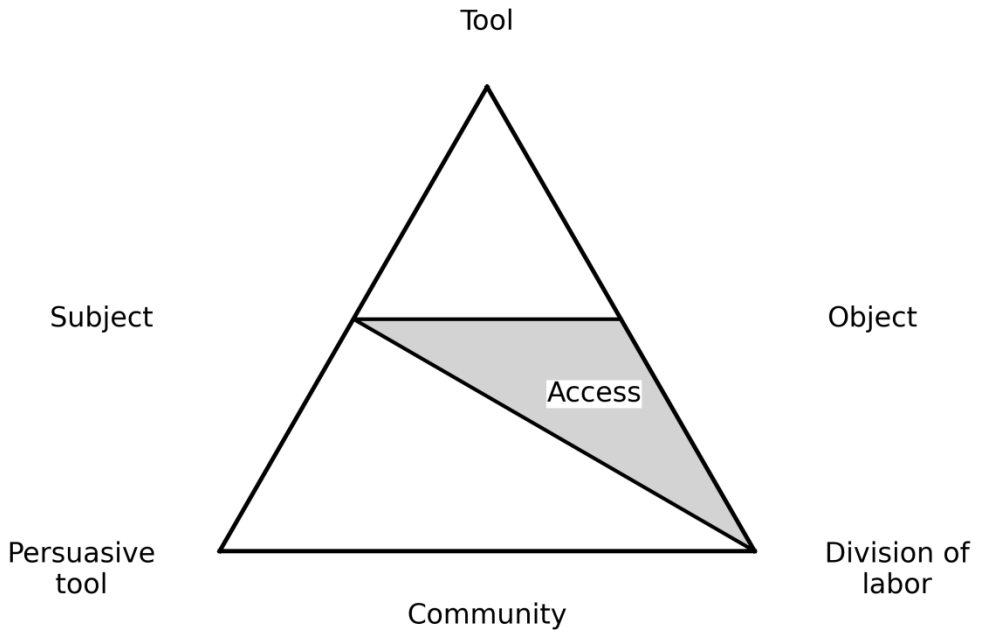

Fig. 6*: Access establishes the possibility of a subject, either individual or collective, to transform the object of an activity.*

By examining this facet, we can influence labor relations within a collective to prevent exploitation, discrimination, and disregard. This aligns with competency frameworks that emphasize progressive entrustment and authentic participation [6-7].

6. Participation (Community ↔ Object through division of labor)

Participation connects community to object through a division of labor by structuring who can shape the object and how. Participation is broader than distribution. Distribution allocates tasks within an existing activity; participation organizes inclusion in object-definition and object-redesign.

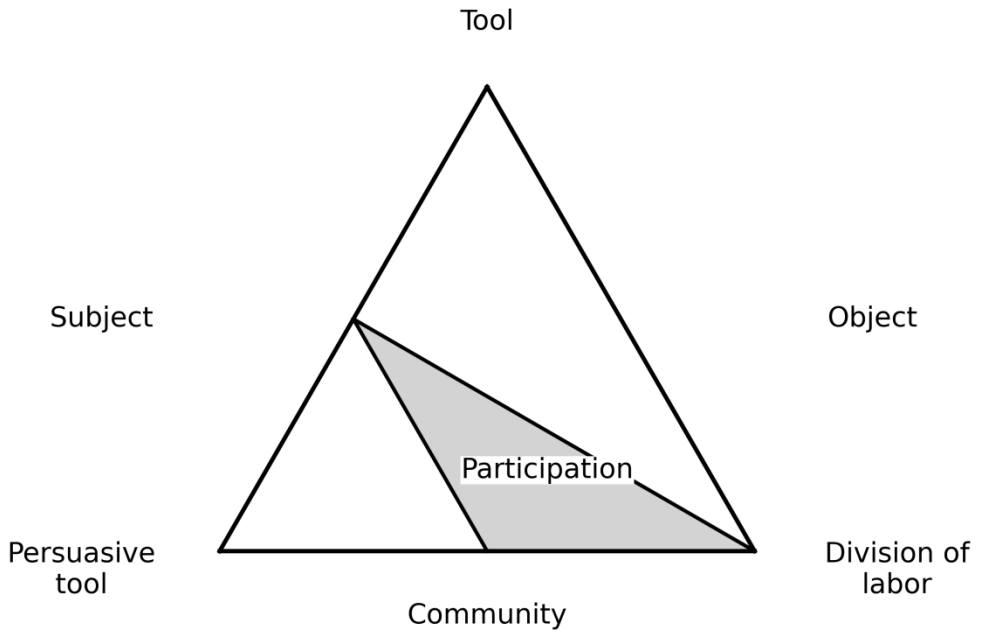

Fig. 7*: Participation demonstrates the community's influence over the assignment of tasks within an activity system.*

In this facet, the division of labor acts as an external force to the activity system. Society limits individuals' participation based on the organization of the production of goods and services within a social formation. However, subjects can gain the voice and power to influence the social division of labor by legitimizing their internal organization and commitment.

Examples:

Clinical services: client and community advisory roles in policy decisions; inclusion of technicians and nurses in care redesign.

Animal husbandry: participatory design of herd-health interventions with producers and local communities.

Animal health research: participatory epidemiology methods in which communities contribute local knowledge, priorities, and interpretation [12].

Integrative schema: actions, connections, and typical artifacts

Action family	System connection	Primary mediational means	Illustrative artifacts and genres (examples)
Production	Subject ↔ Object	Technical tool	Instruments, diagnostics, protocols, lab pipelines, husbandry technologies
Communication	Subject ↔ Community	Persuasion tool	Consultation structures, consent and estimates, case presentations, stakeholder briefs

Distribution	Community ↔ Object	Division of labor	Rotations, triage rules-as-artifacts, role charters, authorship matrices, task boards
Utilization	Community ↔ Subject & Object	Uptake arrangements	Follow-up loops, audit and feedback, implementation cycles, extension and adoption routines
Support	Community ↔ Subject	Technical tool infrastructure	Simulation, scaffolds, supervision protocols, maintenance and calibration routines
Commitment	Community ↔ Object	Binding tools	MOUs, ethics approvals, welfare charters, service agreements, data governance
Knowledge	Subject ↔ Object	Persuasion tool	Evidence summaries, reasoning checklists, diagnostic justification notes
Visibility	Community ↔ Object	Persuasion tool	Dashboards, case logs, publications, welfare reports, incident reports
Access	Subject ↔ Object	Division of labor	Permissions, entrustment steps, role-based access to cases, samples, datasets
Participation	Community ↔ Object	Division of labor	Co-design meetings, community advisory boards, participatory epidemiology sessions

Application to veterinary and animal-sciences education and research

Designing curricula as action repertoires

Competency-based veterinary education asks programs to define outcomes and to align learning experiences with workplace performance [6]. The action typology provides a concrete way to do this: each rotation, course, internship, or research practicum can be specified as a bundle of action families rather than as a list of topics.

A minimal, ethically robust formation sequence should ensure that learners repeatedly practice:

Production with safeguards (support and access),

Persuasion with structured consultation, transparent reasoning, and explicit welfare commitments,

Distribution and participation as governance literacy,

Utilization through follow-up, implementation, and translation routines.

This approach prevents a common distortion in professional education: over-investment in production while neglecting persuasion, utilization, and participation, which are decisive for outcomes and legitimacy.

Teaching persuasion as professional mediation

In veterinary practice, persuasion action is unavoidable: clients decide about care, farms negotiate interventions, and communities accept or resist health measures. Educational design should therefore treat persuasion as a teachable action family with tools that can be developed and assessed.

A practical implication is to assess persuasion competence not as "soft skills" but as instrumented mediation: consultation structure, quality of reasons, ethical clarity, and documented shared decisions. The veterinary consultation model literature shows that consultation is not spontaneous conversation but structured professional work [8].

Utilization as the bridge between education, service, and research

Utilization clarifies where "learning outcomes" become "life outcomes." In clinics, it appears in adherence, follow-up, and observed welfare trajectories. In animal production, it appears in adoption of management changes and in measured effects on welfare and productivity. In research, it appears as knowledge translation and use in decision contexts [9-10].

Designing utilization actions means creating uptake infrastructures:
systematic follow-up and monitoring,
feedback loops to students and supervisors,
adaptation routines rather than rigid replication,
dissemination strategies aligned with local constraints and languages of practice.

Participation and democratic-community orientation

A democratic, community-oriented stance requires that communities can influence object definition and evaluation. Participation actions operationalize this stance by organizing inclusion and voice: advisory boards, participatory epidemiology, co-designed welfare goals, and transparent reporting.

This is not merely ethical. Participation improves epistemic adequacy by incorporating local constraints, tacit knowledge, and situated priorities, which is particularly relevant in animal health fieldwork and herd-health interventions [12].

DISCUSSION

Why separate central from peripheral actions?

The central–peripheral distinction is analytic, not hierarchical. Peripheral actions frequently determine whether central actions succeed. In crises, peripheral actions become central: for example, visibility and commitment become decisive during outbreaks, and persuasion becomes decisive when public trust is fragile.

The distinction is useful because it prevents curricular myopia. Programs often over-credit production competence while under-designing the infrastructures that make production safe, legitimate, and adoptable.

Implications for assessment and program evaluation

The typology supports multi-axis assessment aligned with EPAs:
Production: technical performance and safety.
Communication: quality of shared decision-making artifacts and justifications.
Distribution/access: appropriate role-taking and escalation.
Utilization: follow-up quality, implementation outcomes, reflective redesign.
Visibility/knowledge: documentation quality, evidence use, transparency.
Participation/commitment: community inclusion, ethical compliance, welfare commitments.

This complements EPA-based entrustment by making explicit the action families that EPAs often presuppose but do not separately name [7].

CONCLUSION

Replacing "rules" with a persuasive tool reframes normativity as instrumented mediation rather than abstract constraint. On this basis, we proposed a typology of actions for the action level of activity theory: four central actions that reproduce the object (production, communication, distribution, and utilization) and six peripheral actions that stabilize and develop the system (support, commitment, knowledge, visibility, access, and participation). Applied to veterinary medicine, animal husbandry, and health-science education and research, the typology functions as a didactic scaffold for designing learning environments that are technically competent, communicatively legitimate, democratically grounded, and oriented to welfare and community development.

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