

Schools as Seedbeds of Civilization: The Pedagogy of Proportionate Renewal in the Age of Ecology

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Abstract: This article argues that the enduring coherence of any civilization is not achieved through accumulation and control but through proportionate renewal: the continuous, rhythmic capacity to recognize limits, repair bonds, and re-begin together. In an ecological century, this capacity must be cultivated in schools. Standardized curricula often implicitly reinforce a "Civilization of Thingness" (government, achievements, economy) focused on scale and fixed traits. We propose shifting the classroom's aim from teaching *about* past empires to cultivating the relational capacities necessary for an ecological civilization. We introduce the Pedagogy of Proportionate Renewal (PPR), grounded in the claim that everything that endures does so by rhythmic re-beginning. PPR outlines the educational cycle (Recognition → Rhythm → Response → Coherence), which translates disciplined inquiry into ethical, proportionate action. This approach is operationalized through the FIELD–SONG curricular grammar: nine capacities (e.g., Fit-to-Place Design, Economy of Sufficiency, Gear as Convivial Tools) that replace static civilizational traits with practices students can rehearse in place. The shift is practical. PPR re-casts the school as a civilizational seedbed, altering its time (cyclical inquiry), space (nested commons), governance (polycentric student councils), and assessment (public artifacts with trace). The article details this grammar, specifies the conditions for renewal (consent, trace, reversibility, sufficiency), and sketches an assessment agenda. The wager is that education can train the rhythms by which a society learns to remember its limits and repair its shared life, turning the school into a living architecture of the future.

Keywords: *ecological civilization; proportionate renewal; ecological education; process pedagogy; FIELD–SONG; civilizational seedbeds*

Every civilization begins in a classroom.

Not by proclamation, but in the ordinary choreography of attention—how a teacher opens space, how a student wonders, how a room learns what is worth remembering. The stories we tell about “civilization” in school matter: they teach not only how to read the past but how to practice the future.

In much of American schooling, we introduce civilization through tidy heuristics (GRAPES¹ and its kin): geography, religion, achievements and monumental works, economy and surplus, social classes—sometimes with cities, writing, and “advanced technology” appended. These lists are pedagogically convenient; they are also metaphysically loaded.² They tilt young minds toward an architecture of centralization, accumulation, and control: coherence as what is built big, stored up, and kept still.

An ecological century asks for a different apprenticeship.³ If the world is not a warehouse of things but a mesh of living systems, then a civilization capable of enduring will not perfect control so much as *renew proportion*—learning, again and again, how forms can hold without hardening and yield without collapse. This paper proposes that the classroom can be designed as a *civilizational seedbed* by shifting from teaching *about* civilizations to cultivating the *capacities that make civilizations ecological*.

We introduce here two interrelated frameworks: the **Pedagogy of Proportionate Renewal (PPR)** and the **FIELD–SONG** curricular grammar. PPR rests on a simple claim with far-reaching consequences: everything that endures does so by rhythmic re-beginning. In philosophical terms, we take reality to be relational and processual⁴—coherence arises through ongoing coordination among beings, places, and tools. In educational terms, this

¹ The acronym GRAPES is a pedagogical tool used primarily in middle school social studies to help students organize and analyze the key characteristics of ancient civilizations. Each letter corresponds to a different aspect of a society: Geography, Religion, Achievements, Politics, Economy, and Social Structure. While convenient for teaching, this framework has been criticized for potentially oversimplifying complex historical narratives and emphasizing a specific, Western-centric model of societal development centered on centralized power and monumental works

² See Paulo Freire, *Pedagogy of the Oppressed* (New York: Continuum, 1970); David Orr, *Earth in Mind: On Education, Environment, and the Human Prospect* (Washington, DC: Island Press, 1994).

³ Wm. Andrew Schwartz and John B. Cobb Jr., *Putting Philosophy to Work: Toward an Ecological Civilization* (Anoka, MN: Process Century Press, 2018).

⁴ This metaphysical orientation follows the process-relational tradition, in which reality is conceived as a web of interdependent events rather than isolated substances; see Alfred North Whitehead, *Process and Reality: An Essay in Cosmology*, corrected ed., ed. David Ray Griffin and Donald W. Sherburne (New York: Free Press, 1978).

means the aim of schooling is not the storage of inert ideas⁵ but the cultivation of field sense⁶: the ability to recognize patterns, feel limits, and enact right-sized responses that keep systems alive. Learning, in this view, follows a rhythm—**recognition** → **rhythm** → **response** → **coherence**—and leaves behind trace: revision histories, reasons-for-change, and public artifacts that let communities improve what they inherit. This rhythm, first articulated in the author’s *Significology* and *Anatalism* frameworks, extends the metaphysical claim that meaning and coherence arise through relational renewal.⁷

From this orientation follows a new way of designing curriculum. Instead of rehearsing GRAPES as fixed traits, we translate its impulses into capacities that students can practice in place. We gather these capacities in a mnemonic that keeps the metaphysics close to the ground: **FIELD–SONG**.

- **Fit-to-Place Design** (art/architecture/public works judged by proportion, not scale)
- **Institutions, Polycentric** (governance across levels; the commons as living infrastructure)
- **Economy of Sufficiency** (provisioning within ecological cycles; “enough” as a design target)
- **Literacies of Relation** (narrative, data, and design briefs with auditable trace)
- **Dwelling as Metabolism** (cities/settlements read as stocks, flows, feedbacks)
- **Shared Practices of Meaning** (plural rituals and vows that bind people to place)
- **Occupations as Vocational Mutuality** (roles accountable to the whole and revisable)
- **Networks of Care & Commons** (stewarded infrastructures, not just services)
- **Gear as Convivial Tools** (machines used transparently, reversibly, and under human judgment)

Together, PPR and FIELD–SONG re-cast the school as a practice ground for ecological civilization. The shift is practical, not merely theoretical. It alters the time of learning (from coverage to inquiry cycles), the *space* (from desks to nested commons, labs, and outdoor extensions), the *governance* (from classroom management to student councils and consent

⁵ Alfred North Whitehead, *The Aims of Education and Other Essays* (New York: Macmillan, 1929), pp. 1–2

⁶ “Field sense” is the author’s term for a relational form of perception that links recognition, rhythm, response, and coherence in ecological systems

⁷ Jessica Solomon, *To Be Meaned: A Philosophy of Significology* (Framingham, MA: Lyric Institute, forthcoming); Jessica Solomon, *Origin That Moves: A Cosmotheology of Renewal* (forthcoming).

checkpoints), the *assessment* (from private tests to public artifacts with trace), and the *tool ethic* (from frictionless automation to convivial, accountable use of machines).

This article develops that pedagogical core. First, we articulate the ontology that warrants a renewal-centered education and the educational rhythm that follows from it. Second—and at greatest length—we specify the Pedagogy of Proportionate Renewal: its aim (cultivating sense for proportion), its rhythm (recognition → rhythm → response → coherence), and its non-negotiable conditions (consent, trace, reversibility, sufficiency). Third, we operationalize the pedagogy through the FIELD–SONG grammar, offering design patterns, mini-studios, and assessment anchors for each capacity. Finally, we sketch an evaluation agenda for classroom trials: measures of agency and co-agency, systems reasoning, place attachment, equity in role access, and evidence of proportionate decision-making over time.

If schooling is, as we claim, a seedbed for civilization, then the question is not merely what we teach about past empires, but what practices we place in young hands so the world can keep beginning. This is the wager of proportionate renewal: that education can train the rhythms by which a society remembers its limits, repairs its bonds, and learns—again—to live.

The Pedagogy of Proportionate Renewal

The Pedagogy of Proportionate Renewal (PPR) begins from a metaphysical claim so simple that it is easily missed: everything that endures does so by rhythmic re-beginning. A world of processes, not things, requires a pedagogy of participation, not possession.

Whitehead called the task of education “the art of the utilization of knowledge,” warning that inert ideas—concepts untouched by use—breed decay rather than culture.⁸ In process terms, every act of knowing must pass through the same rhythm by which the world itself advances: the many become one, and are increased by one.⁹ This is not progress by addition but coherence by renewal. The Pedagogy of Proportionate Renewal carries that rhythm into the design of classrooms.

1. Aim: Cultivating Sense for Proportion

To educate proportionally is to teach the art of right-sized response—the capacity to sense when to hold form and when to yield it. Proportion is not balance as compromise

⁸ Whitehead, *Aims of Education*, 1–2

⁹ Whitehead, *Process and Reality*, 21.

but attunement: responsiveness to context, limit, and relation. It is the ethical corollary of ecological civilization,¹⁰ which seeks not mastery over systems but participation within them.

Students schooled in proportion learn to ask:

- What does this system need now?
- How much is enough?
- What traces should we leave behind for those who follow?

Each question assumes that coherence must be renewed, not imposed.

2. *Rhythm: Recognition → Rhythm → Response → Coherence*

Whitehead's own rhythm of education—*romance, precision, generalization*—traces the movement of the world's creative advance: from initial feeling through disciplined patterning to renewed synthesis.¹¹ The Pedagogy of Proportionate Renewal translates this cycle into ecological terms—**recognition, rhythm, response, coherence**—so that each phase becomes not only a cognitive step but a relational act. Recognition replays the wonder of romance but makes it reciprocal; rhythm redefines precision as attunement rather than control; response carries generalization into ethical action; coherence keeps the process open by making learning public and revisable. What Whitehead described as the life of an idea becomes, here, the life of a field.

- **Recognition:** the encounter that awakens care. Students meet a phenomenon directly—water, waste, heat, friendship—and allow it to meet them back.
- **Rhythm:** the discernment of pattern. Through observation and modeling, they learn how flows hold together and where feedback falters.
- **Response:** the act of proportionate intervention. Students propose or enact right-sized changes, mindful of consent and consequence.
- **Coherence:** the return to shared understanding. What was learned becomes public, traceable, and available for renewal.

Each phase carries forward the memory of the last; coherence is never final but rhythmic. The teacher's role is to keep time—holding the pulse of the inquiry without fixing its outcome.

The same pulse underlies Whitehead's account of learning's creative advance. His sequence of *romance → precision → generalization* describes the world's movement from

¹⁰ See Wm. Andrew Schwartz and John B. Cobb Jr., *Putting Philosophy to Work: Toward an Ecological Civilization*. Process Century Press, 2018.

¹¹ Whitehead, *Aims of Education*, 17–18.

encounter, through disciplined attention, toward renewed use. The Pedagogy of Proportionate Renewal renders this pattern in ecological terms—**recognition** → **rhythm** → **response** → **coherence**—so that the life of thought and the life of systems can be read together.

Whitehead's Term	Fielded / Ecological Term	Pedagogical Focus	Description	Why the Renaming Matters
Romance	Recognition	Awakening relation	Students meet the phenomenon directly and allow it to meet them back. Curiosity becomes reciprocal awareness.	<i>Romance</i> in Whitehead names emotional awakening; “Recognition” keeps that but stresses relation—seeing-and-being-seen within the Field.
Precision	Rhythm	Disciplined noticing	Learners trace patterns, measures, and feedback—discovering order without freezing it.	<i>Precision</i> risks suggesting fixity; “Rhythm” honors discipline as repetition with variation —the disciplined noticing of pattern.
Generalization	Response → Coherence	Proportionate action and renewal	Students act within the system they’ve studied, leaving behind a <i>trace</i> —an artifact or practice that renews coherence without closing it.	“Response” foregrounds ethical action ; “Coherence” names the renewed whole that follows. Together they perform Whitehead’s “utilization of knowledge.”
<i>Table 1. Translating Whitehead’s Rhythm of Education into the Pedagogy of Proportionate Renewal</i>				

The renaming is not cosmetic. It moves the language of learning from one of sequence to one of relation—from education as accumulation to education as participation in the creative advance itself.

3. Conditions of Renewal

For the rhythm to hold, four conditions must be cultivated as classroom norms:

- **Consent.** Every learning act involves the will of participants and the integrity of what is studied. Consent turns attention into relation rather than extraction.

- **Trace.** Learning leaves a record—a visible memory of revision and decision. Trace refers to the material evidence of learning’s movement. It keeps past decisions available for revision so renewal is informed, not repetitive.
- **Reversibility.** Every form must be amendable; rollback is a sign of life. Students are encouraged to revisit earlier choices, rebuild arguments, and design artifacts that can be taken apart without loss.
- **Sufficiency.** Work is judged not by scale but by fit—by whether it meets the need without exceeding it. This replaces the industrial metric of “more” with the civilizational ethic of “enough.”

Together these conditions create a moral ecology of learning: knowledge as stewardship rather than possession.

4. *Classroom Architecture*

When a classroom is designed around proportionate renewal, everything changes tempo. *Time* becomes cyclical rather than linear: inquiry weeks spiral through recognition, rhythm, response, coherence. *Space* becomes porous: walls open into gardens, labs, kitchens, and community sites.

Governance becomes participatory: councils replace hierarchies; decision-making is practiced at the scale of shared consequence. *Assessment* becomes public and narrative: students publish artifacts, host exhibitions, and submit trace dossiers instead of private tests. The *teacher* becomes less a transmitter of content and more a *keeper of rhythm*—an attunement instrument ensuring that the learning field stays coherent as it renews.

5. *Machines and the Convivial Contract*

In this ecology, technology is neither villain nor savior but a partner under constraint. PPR adopts what we call the *Convivial Contract*: tools, including AI, may assist learning only if their use is transparent (provenance noted), reversible (human-made equivalent possible), and proportionate (benefit exceeds ecological and cognitive cost).¹² Machines that extend relation are welcome; those that replace relation are refused.

Students learn to document each digital collaboration with a *provenance note*—recording what the tool did, what they accepted or rejected, and why. This practice

¹² The term *convivial* draws on Ivan Illich’s notion of technologies that enlarge human agency without subjugating it; see Ivan Illich, *Tools for Conviviality* (Harper & Row, 1973).

transforms machine use into ethical rehearsal: the act of keeping tools within the bounds of sufficiency and care.

6. *Assessment as Renewal*

Assessment, in the Pedagogy of Proportionate Renewal, is not judgment from above but feedback from within. Each artifact—whether a model, a policy brief, a design, or a performance—is evaluated on six axes:

1. **Systems reasoning:** Does it map the relevant flows and feedbacks?
2. **Proportion:** Is the intervention right-sized to context?
3. **Trace:** Can a reader follow the history of decisions and revisions?
4. **Public use:** Does it contribute to the shared life of the community?
5. **Convivial tools:** Are technologies used transparently and reversibly?
6. **Equity:** Are access, voice, and benefit distributed proportionally?

These axes turn evaluation into reflection: a way for the learning field to check its own coherence.

Accountability in Translation

Renewal-based assessment can coexist with external accountability systems if translation becomes part of the work. Each public artifact is accompanied by a *standards crosswalk*—a short memo that names which competencies or standards the artifact demonstrates—and a *transfer brief* showing how learning generalizes to novel contexts. Where mandated exams remain, students practice *exam translation*: converting their own findings into the language and format of standardized responses. The result is a portfolio that is both authentic and auditable, capable of feeding the metrics the system requires while quietly proving that deeper learning produces measurable evidence. Over time, such portfolios could supply empirical grounds for rethinking how schools define performance.

7. *The Role of the Teacher*

Within the Pedagogy of Proportionate Renewal, the teacher is neither authority nor facilitator but a *participant-keeper*—someone who joins the learning process while safeguarding its rhythm. Their work is to attend to the timing and texture of the inquiry: to notice when curiosity is fading, when structure is needed, when it's time to pause for reflection or move toward application. In doing so, the teacher ensures that recognition is

genuine, that exploration remains disciplined without becoming rigid, that responses stay proportionate to evidence, and that coherence never closes off further questioning.

Teachers model reversibility by revising lessons in public, narrating uncertainty, and practicing sufficiency in their own planning—choosing “enough” rather than “more.” In this way, teaching itself becomes a civilizational art: the daily practice of re-beginning together.

FIELD–SONG: The Curriculum Grammar of Ecological Civilization

If the Pedagogy of Proportionate Renewal provides the rhythm of ecological learning, FIELD–SONG provides its grammar—the recurring capacities through which a classroom becomes a civilizational seedbed. Each letter names a mode of coherence a healthy civilization must practice, and therefore a mode of learning a healthy school must cultivate. Together they outline what students do in a renewal-centered classroom.

In practice, GRAPES does not only list what civilizations *have* (geography, religion, achievements, politics, economy, social classes, etc.); it habituates students to what we might call a *Civilization of Thingness*—a worldview in which coherence is built out of accumulated nouns: governments, temples, walls, surplus, classes.¹³ The center of gravity falls on possession and display. An ecological century asks us to shift that center. A *Civilization of Relation*—what this journal calls *ecological civilization*¹⁴—treats coherence as something kept alive *between* beings, places, and tools. Its grammar is verbs: regenerating soils, stewarding commons, right-sizing flows, revising laws in public, using machines convivially. The move from GRAPES to FIELD–SONG is therefore not a change of mnemonic but a change of metaphysics: from counting things to cultivating relations.

¹³ I use “Civilization of Thingness” to refer to curricular frames that privilege possession, display, and accumulation; by contrast, “Civilization of Relation” names ecocentric frames that privilege proportion, participation, and renewal. The distinction is pedagogical before it is historical.

¹⁴ See Wm. Andrew Schwartz and John B. Cobb Jr., *Putting Philosophy to Work: Toward an Ecological Civilization* (Process Century Press, 2018).

Frame teaches...	Civilization of Thingness	Civilization of Relation (Ecological)
What holds a society	Stored objects and institutions	Ongoing coordination of flows and roles
How time feels	Linear accumulation	Rhythmic renewal (return with memory)
Success signals	Scale, surplus, monument	Fit-to-place, sufficiency, trace
Tech posture	Faster, bigger, frictionless	Convivial, transparent, reversible
Assessment	Private recall	Public artifacts with revision history
Table 2. Contrasting Ontologies of Schooling: From a Civilization of Thingness to a Civilization of Relation ¹⁵		

If GRAPES curates an archive, FIELD–SONG scores a living system. It names the capacities by which a people keeps coherence alive: Fit-to-Place Design, Institutions Polycentric, Economy of Sufficiency, Literacies of Relation, Dwelling as Metabolism—then Shared Practices of Meaning, Occupations as Vocational Mutuality, Networks of Care & Commons, and Gear as Convivial Tools. These are not traits to possess; they are practices to rehearse.

F — Fit-to-Place Design

Every design—an essay, a plan, a structure—should fit its context as a tree fits its soil. Students learn to design with local materials, energy, and culture in mind, measuring success not by novelty or scale but by proportion. A “fit-to-place” classroom asks learners to create structures—material, social, or conceptual—that belong where they are: scaled to local resources, climate, culture, and care capacity.

Why this belongs in an ecological-civilization pedagogy. Civilizations of extraction export their problems; ecological civilizations learn to shape within limits. *Fit-to-Place Design* trains perception for proportion: before students make, they must listen—to the land, to community knowledge, to what materials and energies already move through the field. Design becomes an act of reciprocity rather than assertion.

In practice, students move through four phases: **Recognition**, walking the site and listening to its human and ecological voices; **Rhythm**, mapping constraints and flows to understand the system’s pattern; **Response**, prototyping the smallest viable design and revising it through user feedback; and **Coherence**, publishing a short materials passport

¹⁵ This table contrasts two underlying ontologies of schooling. “Civilization of Thingness” reflects the extractive grammar implicit in traditional civilization frameworks such as GRAPES (see note 1), while “Civilization of Relation” reorients coherence toward living systems, proportion, and renewal.

and reflection so the next class can inherit the work. A class designing a micro-shade structure or reclaiming broken furniture into a bus-stop bench learns proportion through doing.

Assessment emphasizes contextual research, proportionate scale, and traceable revision. *Fit-to-Place Design* apprentices students to proportion itself—listening before building and measuring success by coherence with context rather than by scale or novelty.

I — Institutions, Polycentric

Every living system organizes itself through overlapping centers of responsibility. In a polycentric classroom,¹⁶ decision-making is distributed across scales so choices are made as close as possible to where knowledge and consequence live. Students learn that legitimacy flows from proximity, transparency, and care rather than from hierarchy.

Why this belongs in an ecological-civilization pedagogy. An ecological civilization cannot be governed from afar. Its vitality depends on feedback that is quick, local, and revisable. Polycentric institutions train these civic muscles in miniature. Students practice subsidiarity—the art of letting decisions rest at the lowest competent level—and traceable authority, where every action leaves an accountable record. Governance becomes a living ecology rather than an imposed order.

In practice, students move through four phases: Recognition, identifying a real decision that affects them and mapping who holds the relevant knowledge; Rhythm, analyzing how authority and information currently circulate and drafting a transparent protocol for evidence and revision; Response, convening a small council to deliberate, act, and record its reasons; and Coherence, reviewing outcomes, publishing minutes, and archiving a trace for future councils. When a class manages recess timing or lab safety through such a process, they rehearse how governance adapts in living systems.

Assessment emphasizes transparency, proportionate authority, and responsiveness to feedback. *Polycentric practice* apprentices students to proportionate authority—deciding near the knowledge, recording why, and revising when the world replies.

¹⁶ The use of “polycentric” and the emphasis on commons stewardship echo Elinor Ostrom’s account of self-organizing governance in *Governing the Commons: The Evolution of Institutions for Collective Action* (Cambridge: Cambridge University Press, 1990).

E — Economy of Sufficiency

An economy of sufficiency¹⁷ provides for well-being within limits. In a sufficiency-oriented classroom, success is measured not by throughput or accumulation but by *fit*: meeting the need without stealing from future flows of soil, water, energy, attention, or care. Students learn to ask, with evidence, *how much is enough here*—and to design accordingly.

Why this belongs in an ecological-civilization pedagogy. Extractive cultures normalize “more.” Ecological civilization requires discernment for *proportion*—right-sized goals, right-sized means, transparent trade-offs. Practicing sufficiency in school retrains desire and judgment: it links comfort, function, and dignity to regenerative cycles rather than to endless consumption.

In practice, students move through four phases: **Recognition**, observing how a resource actually circulates (paper, energy, food, time, device use) and listening to what “enough” feels like for different users; **Rhythm**, mapping stocks, flows, feedbacks, and delays while setting explicit *sufficiency thresholds* and *ceiling limits*; **Response**, piloting the smallest viable change—print-on-demand caps, deep-work blocks, smaller default portions with guaranteed seconds—and documenting reasons-for-change; and **Coherence**, comparing before/after indicators, publishing a short *sufficiency brief* (thresholds, data, equity notes), and archiving the trace for the next cohort. A class that caps weekly printing and redirects savings to a shared tool library learns that prosperity can mean *enough for the work and enough to repair the commons*.

Assessment emphasizes threshold clarity, evidence of impact (even small effects), equity in burdens/benefits, and a visible trace others can inherit; watch for rebound effects and ensure opt-outs where needed. *Economy of Sufficiency apprentices students to provision wisely—well-being within limits, argued with data and care.*

The Political Economy of Enough. A pedagogy of sufficiency must eventually meet the economy that measures its schools. Public systems are funded and judged by logics of scale—per-pupil allotments, credit hours, and standardized metrics that reward throughput. The Economy of Sufficiency answers these pressures by making proportion legible. When students document the true costs of learning—time, energy, materials, and emotional labor—they generate an alternative accounting: *total cost of learning (TCL)*.

¹⁷ The framing of “sufficiency” can be situated within ecological-economic discussions of steady-state and post-growth prosperity; see Herman E. Daly, *Beyond Growth: The Economics of Sustainable Development* (Boston: Beacon Press, 1996); and Tim Jackson, *Prosperity without Growth: Economics for a Finite Planet* (London: Earthscan, 2009).

TCL allows a class to ask whether a project's benefit justifies its material and human expenditure, and to design for the smallest viable intervention that meets the need.¹⁸ At the policy level, such accounting could invite funders to reward fit rather than size, valuing practices that reduce waste and dependency instead of inflating outputs. The goal is not austerity but *right relation* between investment and renewal.

L — Literacies of Relation

Reading, writing, modeling, and coding are not solitary achievements but acts of participation—ways a community keeps memory and meaning in motion. In a relational classroom, communication is treated as an ethical practice: every text, diagram, and dataset carries an obligation of clarity, trace, and continuation.

Why this belongs in an ecological-civilization pedagogy. An ecological civilization depends on transparency and shared understanding. If knowledge is to circulate like energy through an ecosystem, it must remain legible and revisable. Literacies of Relation convert private mastery into public coherence, teaching that expression is a form of stewardship—how one's thought enters and sustains the common field.

In practice, students move through four phases: **Recognition**, tracing how information already flows in their project and identifying who will need to understand it next; **Rhythm**, keeping version histories and reasons-for-change while noting data provenance and uncertainty; **Response**, composing a coherent public artifact—brief, manual, dataset, or story—that others can use; and **Coherence**, publishing and archiving that work so future learners can continue responsibly. When students turn runoff data into a watershed brief with clear sources and open questions, they learn that writing is an act of care.

Assessment highlights clarity, provenance, and accessibility across audiences, along with faithful recordkeeping of revisions. *Literacies of Relation turn learning into shared memory—knowledge made inheritable through clarity, trace, and relation.*

D — Dwelling as Metabolism

To dwell is to live *with* a place by participating in its flows. A metabolic classroom treats the school as a living body—energy in, matter transformed, wastes returned, meanings circulated—whose health depends on the proportion and rhythm of those exchanges.

¹⁸ This emphasis on “enough” resonates with ecological-economics accounts of prosperity within limits; see Herman E. Daly, *Beyond Growth: The Economics of Sustainable Development*, Beacon Press, 1996; and Tim Jackson, *Prosperity without Growth: Economics for a Finite Planet*, Earthscan, 2009.

Why this belongs in an ecological-civilization pedagogy. Civilizations endure when settlements keep cycles intact. Seeing dwelling metabolically¹⁹ shifts attention from what we own to how we circulate: water, nutrients, materials, attention, and care. Maintenance—not monument—becomes the civilizational art.

In practice, students move through four phases: **Recognition**, mapping a small number of flows (water, heat, food/waste, paper, attention) and listening to the people who tend them; **Rhythm**, modeling stocks, flows, feedbacks, and delays while taking a short baseline; **Response**, right-sizing a single junction—labeling a scrap bin, adding a door sweep, instituting a device-tray deep-work block—and documenting reasons-for-change; and **Coherence**, comparing before/after indicators, publishing a one-page *metabolism brief* with diagrams and user feedback, and archiving the trace for the next cohort. When a “lunch-loop” team cuts landfill weight by redesigning tray return, or a “quiet heat” crew reduces heater cycling with a simple seal and routine, students learn that coherence is circulatory, not static.

Assessment emphasizes “metabolic seeing” (clear diagrams of stocks/flows/feedbacks/delays), proportionate intervention, small but real evidence of change, and a public trace that others can inherit; measure systems, not people, and aim for sufficiency over mere efficiency. *Dwelling as Metabolism apprentices students to the circulatory life of their settlements—coherence practiced as maintenance rather than imagined as monument.*

S — Shared Practices of Meaning

Communities sustain themselves not only through systems of matter and energy but through repeated acts of significance. In a relational classroom, meaning is made and remade together—through rituals, stories, covenants, and gestures that help people remember what they are keeping alive.

Why this belongs in an ecological-civilization pedagogy. A civilization that endures must renew not only its resources but its reasons. Shared practices—gratitude rounds, reflection circles, repair rituals—are how a community rehearses coherence across difference. They anchor belonging while leaving room for revision. Teaching students to create, steward, and adapt such practices cultivates both reverence and flexibility: the capacity to hold form without hardening it.

¹⁹ The notion of “urban metabolism” provides a scientific analogue for this ecological view of settlement; see Abel Wolman, “The Metabolism of Cities,” *Scientific American* 213, no. 3 (1965): pp. 179–190.

In practice, students move through four phases: **Recognition**, observing which everyday rituals already hold the classroom together; **Rhythm**, discerning when these rhythms falter or exclude and studying parallel practices in other communities; **Response**, co-designing a new or renewed practice that meets a real need—a welcome ritual, a repair circle, an end-of-project reflection; and **Coherence**, documenting how it works, when it should be renewed, and what care it requires. When a weekly gratitude walk or a “repair circle” becomes a steady habit, students experience how meaning grows from repetition with awareness.

Assessment attends to purpose, inclusion, and sustainability of the practice—whether it deepens connection without becoming rote—and cautions against appropriation or coercion. *Shared Practices of Meaning teach students how coherence feels: difference held in rhythm, belonging practiced as renewal.*

O — Occupations as Vocational Mutuality

Work is understood as service to the living whole. In a mutuality-centered classroom, specialization is welcomed *when* it stays accountable, revisable, and shared.

Why this belongs in an ecological-civilization pedagogy. Extractive cultures turn roles into silos and status; ecological civilization treats vocation as coordinated contribution. Students learn that authority flows from proximity to knowledge and the willingness to care, not from fixed hierarchy.

Redistributing Prestige. Because the labor of maintenance has historically fallen along lines of gender, race, and class, ecological civilization must re-value care as visible expertise. Vocational Mutuality formalizes stewardship roles as legitimate forms of mastery. Students who design repair protocols, mediate conflicts, or maintain data quality earn the same recognition as those who innovate. Rotation schedules ensure that everyone experiences both routine care and high-visibility tasks, redistributing not only work but honor. Over time, prestige accrues to those who sustain coherence, not merely those who initiate it.²⁰

In practice, students move through four phases: **Recognition**, shadowing the real work inside a project and surfacing invisible labor; **Rhythm**, mapping how roles meet system needs (accuracy, safety, equity) and where gaps or overloads occur; **Response**, piloting right-sized role changes—rotations, mentorships, split duties—with reasons-for-change; and **Coherence**, comparing quality and fairness before/after and

²⁰ This reframing of care and maintenance as civic expertise parallels feminist ethics of care that link justice to the visibility and distribution of care labor; see Joan C. Tronto, *Caring Democracy: Markets, Equality, and Justice* (New York University Press, 2013).

publishing a short roles charter for the next cohort. When a waste-stream team formalizes setup/measurement/cleanup/communications roles and rotates them with mentoring, contamination drops and burden evens out.

Assessment emphasizes clarity, equity, and capability growth, with attention to continuity where safety or expertise requires it. *Vocational Mutuality teaches that talent ripens as service to the whole—roles are designed, rotated, and revised to keep work proportional and shared.*

N — Networks of Care & Commons

Commons are the infrastructures of shared life—gardens, tools, datasets, norms—kept alive by patterned care. A care-centered classroom treats maintenance as moral practice.

Why this belongs in an ecological-civilization pedagogy. A civilization endures when what is shared is tended—openly, fairly, and with memory. Designing and repairing commons builds ecological literacy and civic trust at once.²¹

In practice, students move through four phases: **Recognition**, naming what is already shared and where care is fraying; **Rhythm**, mapping flows, rules, and maintenance labor; **Response**, co-creating a simple commons charter (access, roles, repair protocol, revision triggers) and piloting stewardship; and **Coherence**, reviewing durability and fairness, revising the charter, and archiving a brief care log. A tool library managed with rotating stewards and a repair budget quickly becomes both resource and lesson.

Assessment highlights transparency, durability, and equitable labor distribution; guard against “volunteer traps” by scheduling stewardship and making care visible. *Networks of Care & Commons teach that shared life persists through maintenance—governing and renewing the tissue that holds us together.*

Justice of the Commons. A commons is equitable only when care itself is shared and resourced. Each shared system therefore carries a *care budget* (time, materials, emotional labor) and a *burden audit*: Who tends, who benefits, who is left out? Students review these audits quarterly and adjust protocols to prevent invisible or gendered labor from recurring. Care that was once unpaid becomes *collective practice and credited learning*—an economy of attention restored to fairness.

²¹ The emphasis on commons stewardship and shared governance resonates with Elinor Ostrom’s analysis of self-organizing systems in *Governing the Commons: The Evolution of Institutions for Collective Action* (Cambridge University Press, 1990).

G — Gear as Convivial Tools

Technology remains ethical when it enlarges human agency *within limits*. Convivial tools are transparent, reversible, and accountable to those affected by their use.

Why this belongs in an ecological-civilization pedagogy. Ecological civilization requires technological humility: discernment about when machines extend relation and when they erode it. Students learn to govern tool use, not be governed by tools.

In practice, students move through four phases: **Recognition**, meeting their machines honestly and tracing material/data origins; **Rhythm**, drafting a class Convivial Contract and keeping provenance and uncertainty notes; **Response**, testing the same task with and without the tool to judge fit and documenting reasons-for-change; and **Coherence**, publishing a concise tool ledger and revising the contract from evidence. A class that pairs AI-assisted and human-only writing—and can explain what the machine added, what it distorted, and how they rolled it back—learns discernment rather than dependence.

Assessment attends to transparency, reversibility, and articulated agency shifts; prohibit surveillance/biometric uses and ensure opt-outs. *Convivial Tools train students to keep machines inside human purposes and ecological limits—means that serve the work without replacing the worker.*

Curriculum as Song

The sequence of FIELD–SONG is not linear but melodic. Each capacity recurs across disciplines and scales; together they compose the learning field’s “song.” A science unit on soil health, a humanities seminar on justice, a design lab on water use—all can be tuned to these same notes. Teachers plan with the question: Which part of the song are we practicing now?

Projects often weave several letters at once. A **River Commons** unit, for example, might engage **F** (fit-to-place design) through green infrastructure, **E** (economy of sufficiency) through water budgets, **N** (networks of care) through partnerships with municipal agencies, and **G** (gear as convivial tools) through AI-assisted mapping. Students learn systems thinking by hearing how the melody modulates across domains.

Assessment in the Key of FIELD–SONG

Each letter doubles as an assessment lens. Instead of grading isolated outputs, teachers and students look for evidence of:

- **Fit:** Is the work proportionate to context?

- **Institutional awareness:** Who decides, and how transparently?
- **Sufficiency:** Does the proposal meet need without excess?
- **Relation:** Are sources and revisions traceable?
- **Metabolic thinking:** Are flows mapped and improved?
- **Meaning:** Has the project deepened shared understanding?
- **Mutuality:** Are roles and benefits distributed?
- **Care:** Is the commons strengthened?
- **Conviviality:** Are tools used ethically and openly?

These become not nine rubrics but nine habits of perception—a civilizational literacy practiced through every subject.

Teacher as Composer

Within FIELD–SONG, the teacher’s task is to orchestrate coherence: to weave the week’s lessons so that the capacities sound together without forcing harmony. Planning becomes composition—deciding which notes to emphasize, which to let rest. The result is not a perfect chorus but a living polyphony of inquiry, reflection, and renewal.

FIELD–SONG names the capacities; pedagogy gives them rhythm. What remains is to set that grammar into the daily ecologies of school—how we keep time, shape space, share authority, and make learning public. In practice, this means inquiry weeks that cycle predictably (recognition → rhythm → response → coherence); rooms organized as nested commons that extend outdoors; polycentric councils that keep decisions near the knowledge they require; assessments that leave a visible trace others can inherit; and a convivial contract for tools. The final section gathers these moves under a single claim—*schools are civilizational seedbeds*—and specifies what to build (routines, roles, partnerships), what to measure (agency, systems reasoning, proportionate decision-making, equity), and how to study it (classroom-embedded, design-based research²²) so that renewal is not only felt but evidenced over time.

Schools as Civilizational Seedbeds

If FIELD–SONG is the grammar and PPR is the rhythm, the seedbed is the *setting*: the living arrangement of time, space, governance, assessment, and partnership that lets

²² Design-based research integrates theory development and classroom practice through iterative cycles of design, implementation, analysis, and revision; see Thomas C. Reeves, “Design Research from a Technology Perspective,” in *Educational Design Research*, ed. Jan van den Akker, Koeno Gravemeijer, Susan McKenney, and Nienke Nieveen (London: Routledge, 2006), 52–66.

renewal take root. The aim is not to add “ecological civilization” as a unit, but to *compose the school day so these capacities are the way school breathes*.

1) Time: A Rhythmic Week (repeatable, humane)

School time becomes rhythmic rather than linear—a living cycle that mirrors the creative advance of learning itself. Each week follows the pattern of **Recognition → Rhythm → Response → Coherence**: on Mondays students encounter phenomena through field walks, interviews, or artifact study; midweek they analyze and model patterns; on Thursdays they test proportionate interventions; and Fridays close with public reflection and the archiving of trace. A daily studio block of ninety to one hundred twenty minutes anchors this tempo: brief openings for centering or gratitude, extended collaborative work where roles rotate, a short documentation period for version notes and decisions, and a closing circle to name next steps. The aim is not coverage but coherence—the art of keeping inquiry alive without rushing its pulse.

2) Space: Nested Commons

Classrooms become nested commons—spaces designed for permeability and participation. Inside, stations correspond to FIELD–SONG capacities: a Fit table for design work, a Relation bar for data and writing, a Metabolism wall for system maps, a Commons shelf for shared materials, and a Convivial Tools dock for technology under the contract. Beyond the room, outdoor extensions—the garden, shade structure, water catchment, and reading grove—link learning to local ecologies. Hallway galleries display public artifacts with QR codes that open digital briefs and datasets, while community nodes such as the library, town hall, or watershed office serve as regular studios where students share findings and gather feedback.

3) Governance: Polycentric by Design

Governance in a renewal-centered school is *polycentric*—distributed across overlapping councils that keep decisions close to their knowledge and consequences (see note 16). A weekly *class council* reviews ongoing work and revises norms; rotating studio leads steward roles and maintain trace; short-lived *issue councils* deliberate on concrete matters like recess heat, lab safety, or hallway noise, escalating only when evidence requires it. Each council keeps brief minutes and identifies clear revision triggers. A *partner council* of students, teachers, and community members meets monthly to assess projects, ethics, and handoffs.

Through these nested deliberations, students practice proportionate authority: decisions are transparent, reversible, and scaled to their scope. Governance becomes the daily rehearsal of ecological citizenship.

4) Roles: Vocational Mutuality in Practice

Roles become instruments of rhythm rather than hierarchy. Each studio names its active roles—data keeper, storykeeper, commons steward, equity monitor, tool verifier—and rotates them predictably so that skill and burden circulate. Mentorship pairs ensure continuity while cross-training widens competence. Every role includes a short charter describing purpose, tasks, and handoff steps. The teacher monitors flow: not who holds authority, but whether knowledge and labor remain in right proportion. In this way, work itself becomes pedagogy—visible, shared, and renewable.

5) Assessment: Evidence of Renewal (*not point-grabs*)

Every project culminates in a *public artifact*—a design, model, policy brief, or exhibition—accompanied by a trace dossier that documents versions, reasons-for-change, and tool provenance. Students gather before-and-after evidence tied to a real system, write a short *proportion note* explaining why their intervention was right-sized, and add a brief *equity reflection* on who benefited and who carried the burden. Each semester ends with a *FIELD-SONG portfolio*—nine concise memos, one for every capacity—demonstrating how learning and coherence renewed across the term.

6) Machines: The Convivial Contract, Lived

Technology operates under a simple Convivial Contract: tools may extend human agency only if their use is transparent, reversible, and aligned with the aims of learning (see note 12). Students keep *provenance and uncertainty notes* for any machine-assisted work, demonstrate *rollback* by reproducing outputs manually, and meet regularly to update the tool charter. Periodic no-device blocks restore judgment, craft, and shared attention. Machines thus return to their proper scale—helpers within, not drivers of, the learning field.

7) Partnerships: Place as Co-Teacher

Ecological learning depends on reciprocity with the world beyond the school. Partnerships with watershed stewards, farms, repair shops, libraries, town boards, and

mutual-aid groups make *place a co-teacher*. Students contribute monitoring, design briefs, and exhibitions; partners offer constraints, feedback, and local wisdom. These exchanges ground theory in lived systems and teach that relationship—not extraction—is the medium of civilization.

8) *Safety & Ethics: Guardrails for Renewal*

Renewal requires boundaries that keep participation safe and consented. Projects that touch identity, health, or home include explicit opt-in points and shared rule-making. Evaluation focuses on systems, not people; data is anonymized and student-owned. Accessibility—translation, sensory variation, timing flexibility—is built into every design cycle. A small *repair budget* of time and materials accompanies each commons so care remains possible without exploitation. Ethics here are not an overlay but the architecture that lets renewal continue.

9) *Research & Evidence: Show the Change*

The pedagogical experiment is itself a research design. Classrooms practicing PPR document learning through *design-based implementation research*, gathering qualitative and quantitative evidence of agency, systems reasoning, and proportionate decision-making. Indicators include improved clarity in flow diagrams, the fairness of role rotation, and the quality of student justifications for scale and sufficiency. Portfolios, briefs, council minutes, and tool ledgers form the data corpus; analysis focuses on patterns of rhythm and revision. Each term, two design sprints invite external feedback and adjustment. Student authorship and opt-out rights are protected; anonymized summaries feed a growing open archive of what renewal looks like when practiced.

10) *A Small Scene (how it feels)*

Friday afternoon. The studio smells like rain from the new catchment barrel. On the wall, last month's heat-loss brief sits beside the updated door-sweep maintenance card; a fifth-grader is explaining to a facilities partner why the revision trigger is now "three consecutive drafts felt in the hall." At the trace table, two students compare their AI-assisted and human-only letters to the school committee, circling lines the council flagged as unclear. The class council closes by scheduling next week's **Recognition** walk along the culvert and by thanking the "setup/close-down" team for solving the micro-spill

problem with a labeled tray and a new handoff step. Nothing is finished; everything is underway. The school breathes.

The Systems We Inherit

Any proposal for renewal must live inside the institutions it hopes to transform. Schools operate within financial and regulatory ecosystems optimized for scale, not proportion. Rather than rejecting these constraints, PPR treats them as material for redesign. Funding models can be read as flows; accountability rubrics as feedback loops. By tracing where time and money actually move—toward testing, facilities, digital infrastructure—students and teachers alike can identify leverage points for sufficiency. The same analytic tools used to study energy and waste can map the circulation of value in schooling itself. When the system is read as a metabolism, reform stops being a distant policy act and becomes an act of collective noticing—the first step in renewing not only curriculum but the civic imagination that sustains it.²³

Coda: As If

It would be easy—on certain afternoons, in certain meetings—to call the Pedagogy of Proportionate Renewal a pipedream. Budgets thin, schedules inflexible, devices hungry, attention frayed. The forms we’ve drawn here can feel larger than the room that must hold them.

But the ethic of becoming is not optimism; it is practice. We do not wait for a world to deserve renewal before we rehearse it. We live *as if*²⁴ an ecological civilization were already asking something of us, and then we answer—locally, proportionately, again tomorrow. This “as if” is not naïveté; it is counter-economics in miniature. Each classroom that practices proportion is already redistributing power and redefining value—showing that renewal is not a luxury of abundance but a discipline of enough. To live as if is to prototype the culture we cannot yet fund but must nevertheless begin to build.

As if reorients the will. It treats the classroom not as a container of scarcity but as a seedbed with enough light to begin: one inquiry cycle held with care; one commons tended; one right-sized decision made near its knowledge; one tool used convivially and

²³ This reading of schooling as both site and symptom of systemic constraint resonates with Paulo Freire’s critique of institutional reproduction and his call for education as an act of liberation; see Freire, *Pedagogy of the Oppressed*, Continuum, 1970.

²⁴ Jessica Solomon, “As If It Were Real: The Ethic of Speculative Metaphysics.” *Becoming Is the Ethic*, Substack, 2025.

logged; one public trace left for those who follow. The scale is small on purpose. Renewal learns by repetition.

We do not claim that PPR fixes school. We claim that it changes its verb: from having to holding, from managing to maintaining, from coverage to care. Lived *as if*, these verbs accumulate. They become habit. Habits become culture. And culture—the quiet choreography of attention and repair—becomes the civilization we are willing to keep.

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