

Reinterpreting Neuromyths as Epistemic Artifacts: Democracy, Knowledge, and Meaning Making in Education.

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Abstract: The philosophical stakes of neuromyths (learning styles, hemispheric dominance, etc.) extend far beyond the myths themselves. Neuromyths force us to confront foundational questions about how educators know, what that knowledge is for, and how meaning is constructed in the practice of teaching. Reinterpretation of neuromyths as edu-myths offers a response that honors the humanity of learners and the intellectual agency of teachers who create, refine, and implement conceptual tools that illuminate learning rather than distort it. This transforms debate over neuromyths into a broad philosophical project: The reconstruction of educational epistemology. Reinterpretation situates educational knowledge within communal narratives and institutional structures where teachers, via testing and reflection, forge conceptual tools for effective use in context.

Science is a powerful presence in today's educational landscape. School districts heavily advertise “research-based practices,” teacher preparation programs emphasize “evidence-based instruction,” and policymakers invoke “neuroscience” to justify curricular interventions. However, underneath this vague veneer of scientific certainty lies a much more complicated reality. Much of what circulates within schools under the “guise of neuroscience” reflects neither scientific consensus nor neuroscientific nuance. Teachers continuously rely on the language of learning styles, hemispheric dominance, and other simplified explanations of cognition. These claims are often repeated long after they have been empirically discredited. The persistence of these neuromyths is well documented; but the prevalent academic response remains weak. Most administrations aim to debunk myths and call for improved dissemination of accurate information. While this corrective impulse is understandable, the philosophical questions embedded within these myths demand deeper examination and broader consideration. For instance, Why does this misinformation continue to persist among well-trained educators? What epistemic needs do myths fulfill that empirical data alone cannot? How should educators understand the relationship between scientific knowledge and the lived, interpretive realities of teaching? And, as we shall see, understanding neuromyths as artifacts of hybrid epistemologies allows us to raise other, still deeper philosophical issues: What counts as legitimate (i.e., justified) knowledge in teaching? How do different epistemic domains — for example, neuroscience, psychology, philosophy, and classroom experience — interact in teacher decision-making? These fundamental questions raised by neuromyths cannot be answered solely on the premise of neuroscience.

Although they are inadequate to teacher need, neuromyths should not be dismissed as merely false beliefs awaiting correction. Instead, study of them reveals fundamental tensions regarding what counts as “legitimate knowledge” in education. Neuromyths are an evolving epistemic artifact constructed and perpetuated by humans. Understanding of neuromyths sheds light on how scientific claims travel across cultural and institutional domains and how teachers construct meaning within their practice. Viewing neuromyths solely as errors ignores their epistemological, ethical, and symbolic functions. Teachers do not cling to myths because teachers are irrational or scientifically naive. Teachers rely on neuromyths because myths are able to provide metaphors and interpretive frameworks that help render complex phenomena intelligible. Myths arise not from ignorance, but from the inadequacy of available conceptual tools. Unfortunately, neuromyths themselves are defective insofar as they traffic in reductionistic

models and probabilistic findings that, as uncritically accepted generalities, often fail to speak to the contextual and intuitive work of teaching. Of course, this is not to say that neuroscience is entirely an ideology, unsupported by any data or entirely unrevised by teacher use and communal understanding. Yet these two existential worlds — scientific discourse and teaching practice — inevitably collide, creating distortions in epistemic spaces. Neuromyths materialize within this translational gap, where myth functions as a bridge allowing educators to cross from generalized knowledge to embodied experience. However, neuromyths fail to make a solid connection between ideas and implementation. The failure of neuromyths creates the need for construction of new myths, ones more adequately supportive of effective teaching.

I.

Firstly, claims that neuromyths are scientific explanations must be rejected. A philosophical account of neuromyths must begin by acknowledging the empirical basis for rejecting neuromyths as literal truths. Their empirical inadequacy is well established, and educators have a professional duty to avoid pseudoscientific interpretations that may harm students or undermine pedagogical effectiveness. The unsubstantiated idea that students innately possess some dominant learning modality or “style” (visual, aural, kinesthetic, etc.) continues to shape teacher practice. This occurs despite the lack of scientific support for the belief. Harold Pashler and his colleagues reviewed the evidence and ultimately found no support for the “meshing hypothesis,” the idea that matching instruction to a student's preferred modality improves learning.¹ Frank Coffield's systematic review of learning styles literature reaches an even stronger conclusion: Most learning styles lack both reliability and validity.² John Hattie's synthesis of over 800 meta-analyses confirms the claim that modality-based differentiation has a negligible impact on learning compared to practices such as explicit instruction or formative feedback.³ Sadly, however, surveys reveal that more than 90% of teachers endorse at least one neuromyth. This is even after completing professional development leading away from endorsement of neuromyths!⁴ The severity of this disconnect invites philosophical scrutiny: Why do empirically false beliefs persist even when teachers are exposed to corrective information?

Standard answers attribute the persistence of myths to communication failures, lack of properly trained teachers, or educator reliance on outdated ideas. However, these explanations are inadequate. Dekker et al. found that even teachers with substantial neuroscience training endorsed neuromyths at very high rates.⁵ The issue is not a deficit in communication, training, or professional development. There is something much deeper at stake. The persistence of neuromyths reveals an epistemic void in which teachers lack accessible metaphors for understanding complex ideas. Unable on their own to fill the empty epistemic space between research and instruction and faced with holes in teaching theory, teachers tend to draw on cultural idioms available to them to fill in the gaps. In doing so, educators are actively trying to reach for explanatory frameworks that help them respond to a large diversity of learners in ways empirical research alone is unable to provide. Seeing neuromyths as performing an

¹ Harold Pashler et al., “Learning Styles: Concepts and Evidence,” *Psychological Science in the Public Interest* 9, no. 3 (2008): 105–119.

² Frank Coffield et al., *Learning Styles and Pedagogy in Post-16 Learning: A Systematic and Critical Review* (London: Learning and Skills Research Centre, 2004).

³ John Hattie, *Visible Learning* (New York: Routledge, 2009).

⁴ Sanne Dekker et al., “Neuromyths in Education: Prevalence and Predictors,” *Frontiers in Psychology* 3 (2012).

⁵ Ibid.

epistemological function reshapes the problem presented by neuromyths. Rather than viewing neuromyths as isolated misconceptions in need of correction, we can understand them as artifacts of epistemology that are produced at the intersection of scientific authority, pedagogical intuition, and cultural imagination. Neuromyths arise because scientific knowledge is not readily applicable to the relational, context-dependent judgments teachers are required to make. Neuroscience may illuminate the mechanics of memory and perception, but it is unable to detail how to instruct an educator to interpret the uniqueness of a student and the meaning of that student's actions. When prevailing suppositions and theories fail to supply conceptual structures relevant to the lived reality of teaching, teachers must compensate by casting about for other, available ideas. But this procedure merely cobbles together an incomplete conceptual coherence; too readily accepted in a context where some such explanation is so urgently needed. Examining the reasons behind the persistence of neuromyths clarifies the epistemological tension between research and practice. The task is not to eliminate these structures but to examine their origins, functions, and limitations, to put them to use for pedagogical success. Among thinkers typically studied in Education programs, Ralph Waldo Emerson, Nel Noddings, John Dewey, and Jane Addams provide conceptual tools for construction of myths more adequate than neuromyths as starting points for engaging teachers in philosophical investigation of the teaching profession.

Emerson offers an account of knowledge as fundamentally metaphorical. He emphasizes the human tendency to interpret the world through symbolic frameworks that go beyond empirical precision. Emerson explicitly states that every understanding is a "new circle" that endlessly expands as insight continues to grow.⁶ For Emerson, knowledge is always provisional, always metaphorical, never literal. Emerson helps us see that the problem neuromyths present for teaching lies not in the metaphors themselves, but in the stagnation of the metaphors. Things go wrong when interpretative approximations transform into dogmatic assertions. A metaphor, such as being "a visual learner," becomes harmful when it restricts available options for study of subject matters to the single mode presumably "preferred" by some student. Dewey's pragmatism offers a further layer of insight. Ideas are instruments. Not a mirror of reality.⁷ Dewey's notion of "warranted assertibility" insists that beliefs must earn legitimacy through the consequences they produce in practice. The value of conceptual tools lies not in their literal accuracy, but in their ability to guide intelligent action. Neuromyths are instrumentally unhelpful. They misdirect attention, constrain interpretation, and undermine inquiry. Myths that inhibit growth, distort perception, or create intellectual blind spots cannot be warranted. Teaching requires conceptual tools that mediate complexity, not inadequate ideas that deteriorate it.

Dewey's moral concerns about students' stunted growth in the face of stultified inquiry find full expression in Noddings' account of the ethical relationality of teaching. Teaching is not merely the transmission of content but is the cultivation of caring encounters.⁸ Teachers must understand students to be particularized individuals who are situated within their own unique histories and lives. Language such as "being an auditory learner" tends to act as shorthand for teacher attentiveness; but that description is flawed. The ethical danger lies not in the desire to differentiate instruction, but in the reduction of students to fixed categories that foreclose future

⁶ Ralph Waldo Emerson, "Circles," in *Essays and Lectures*, ed. Joel Porte (New York: Library of America, 1983), 395–407.

⁷ John Dewey, *The Quest for Certainty* (New York: Minton, Balch & Company, 1929).

⁸ Nel Noddings, *Philosophy of Education* (Boulder, CO: Westview Press, 2007).

growth. Philosophical reinterpretation of neuromyths preserves the authenticity of the relational attentiveness Noddings demands by discarding deterministic narratives that actively distort learning. Addams extends Noddings' (inter)personal moral analysis into the cultural realm when she argues that individuals need symbolic frameworks that connect personal experience to broader social meaning.⁹ Communities fragment when they lack cohesive narratives. In accordance with Addams' thinking, neuromyths function as cultural narratives that seek to make sense of learning within American cultural commitments to uniqueness and self-expression. They offer a narrative of individuality and the appearance of being grounded in scientific authority. As Addams might suggest, neuromyths specific to the teaching profession become a resource that helps teachers make sense of their identity as professional educators. Neuromyths are presumed to be something all teachers know about. Nonetheless, although Addams' insight does help to clarify the resilience of neuromyths, it does not excuse their empirical inaccuracy. As Dewey might object, intractable commitment to scientific pretense subverts the cultural narrative constructed around neuromyths.

As harmonious as these philosophical frameworks may seem — Emerson's poetic approach to knowledge, Dewey's insistence on empirical adequacy to warrant knowledge claims, Noddings' ethic of care, and Addams' moral awareness of cultural relativity, — when taken together as a group they stage a philosophical conflict. They collide and conflict constantly. However, the conflict is not carried out just for the sake of discord; it creates needed conceptual heat to forge a more functional mythos for the teaching profession than the one neuromyths provide. Noddings questions Emerson's naïve assumption that metaphors are inherently good things by pointing out that some metaphors may cause harm, Emerson wishes to expand Dewey's understanding of knowledge to make room for claims that may not be susceptible to empirical confirmation. Addams challenges Dewey on the presumed universal sameness of inquiry and reminds Noddings that care is not a monolithic concept, either, but takes different shapes and forms in different cultures. And Dewey insists that Emerson, Noddings, and Addams all find warrant for any speculative metaphors, moral maxims, and cultural relativities they wish to assert. Tensions among these thinkers push the argument beyond resolution via summary of philosophical viewpoints. They create genuine philosophical stakes.

Synthesizing these four philosophical points of view forces us to confront a deep epistemological problem: Teaching is an activity that requires conceptual frameworks that neither science nor metaphor alone can adequately provide. If teacher knowledge requires metaphor, then myths hold conceptual value for teaching. If teaching demands empirical clarity, then myths at odds with science must be abandoned and myths more accommodating of science found. Teachers operate within hybrid epistemic conditions as their decisions must integrate empirical findings, ethical commitments, intuitive judgments, and cultural knowledge. It is vital that teachers interpret behavior that cannot be quantified and decipher internal states that cannot be directly observed. Affective, factual, social, and cognitive factors must be attended to simultaneously. The question is not whether neuromyths are true or false. The question is what sort of myths do educators need to think critically and wisely about teaching. Neuromyths show us how to assess the (in)adequacy of myths adopted in support of the teaching profession. Myths in education lose validity when they get in the way of good teaching rather than facilitate effective pedagogy. The overall challenge is to begin the quest for the conceptual tools educators

⁹ Jane Addams, "The Subjective Necessity for Social Settlements," in *The Jane Addams Reader*, ed. Jean Bethke Elshtain (New York: Basic Books, 2002).

deserve, that is, to develop alternative metaphors that convey meaning without distorting science. Eliminating neuromythologies without replacing their interpretive function leaves teachers epistemically stranded. Adequate reinterpretation of neuromyths into what may be called “edu-myths” honors the symbolic nature and allegorical manner of teaching whilst simultaneously grounding new conceptual tools in both ethical and empirical responsibility. Philosophical reconstruction of neuromyths into edu-myths must take a form that allows educators to retain the cultural meaning-making and structural stability gained via shared myths without allowing (or requiring) teachers to endorse false, that is, unwarranted, pseudoscientific claims.

II.

As a second step in the reconstruction of neuromyths, neuromyths must be interpreted rather than simply eliminated. Neuromyths are cultural artifacts that illuminate how educators attempt to integrate disparate forms of knowledge, especially what they study while in teacher education programs and what they learn during the lived experience of teaching. When approached as a philosophical puzzle, neuromyths reveal important insights regarding meaning-making, metaphor, and the interpretive nature of teaching. Under philosophical reinterpretation, neuromyths can be transformed into more encompassing metaphors that support rather than distort immensely thoughtful pedagogical practice. The task at hand is not to defend myths but to understand the epistemic functions they serve in order for educators to be able to supersede failed myths, such as neuromyths, by constructing conceptually stronger and epistemically more responsible frameworks. Much is revealed about the nature and purpose of educational knowledge itself by treating neuromyths as a lens through which to observe and resolve broader epistemological tensions such as educators' validation of evidence, how laboratory experiment gets negotiated into pedagogical context, and what counts as meaningful knowledge in teaching.

Treated as an intellectual endeavor, teaching is distinct, if not unique, in the manner in which it synthesizes two forms of knowledge — scientific and symbolic — that operate under fundamentally different assumptions. Scientific knowledge aims to predict, explain, and generalize. Allegorical knowledge seeks to interpret, evaluate, and respond meaningfully in specific contexts. The friction between these two epistemic aims becomes apparent when teachers attempt to put scientific knowledge to use in culturally imbued practice. Neuroscience may offer a precise account of how working memory is limited and how neural networks can reorganize with practice, etc.; but such findings are abstract. They are unable to translate directly into decisions about grouping students, structuring classroom discourse, or even interpreting a child's confusion. Any attempt to put scientific findings directly into place as classroom practice is a process inherently vulnerable to distortion. The precision of science is lost as it moves from experimental conditions to classroom environments. However, the authority of science remains. When this sense of authority attaches itself to cultural metaphors without any scientific credibility, like neuromyths, epistemic mirages that falsely appear scientific lead teachers away from effective pedagogy.

But pseudoscience need not be the inevitable result of science finding its way into classroom practice. The solution is not to remove science from education but to submit science to scientific scrutiny *in* education. To see teachers, metaphorically speaking, as the final test of the claims of education science is the best way to improve the quality of translation of science into practice. Dewey's emphasis upon inquiry offers a direct model for this. Translation of science into classroom context should be iterative, reflective, and provisional. Teachers must utilize scientific

findings as tools rather than made to treat what science tells them as dictates to be followed slavishly. Teachers must interrogate the complexities of research rather than be made to accept research at the bare minimum of simplistic narrative. Yes, such a reconceptualization of teachers at work would require epistemic training few teachers genuinely receive in the course of study comprising most teacher education programs. Teacher education often places emphasis on memorizing “scientifically endorsed” strategies over conceptual understanding of how to implement strategy across a wide diversity of students. Without solid philosophical grounding gained via teacher education courses, teachers lack the tools to be able to evaluate conceptual frameworks in a critical manner. This intellectual vulnerability Education students acquire as they study to become teachers gives bad ideas, like neuromyths, ample soil in which to seed and grow. “Teacher as independent researcher,” however, is a metaphor that replaces teacher vulnerability with teacher vitality. Teacher test of education research and theory is the best way for teachers themselves to discern the pseudo- from the genuinely scientific in education thinking. Finally, the edu-myth that “All teachers know how to test education science for contextual validity and reliability.” is an element of teacher mythos acceptable to both Dewey and Emerson on knowledge. Teacher as researcher is a teacher in search of warranted assertibility in context for scientific claims in education. “Teacher as researcher” supplies a metaphor guaranteed to keep expanding teachers’ circles of knowledge as they do their jobs.

The edu-myth of teacher as researcher also fits with Noddings' ethic of care. Noddings insists that teachers must avoid practices that undermine students' ability or restrict their perceived potential. Neuromyths can indeed undermine students' abilities and restrict their perceived potential. When a student is labeled as, say, a "kinesthetic learner," the label may feel affirming; however, it can quickly become limiting. Research on expectancy effects indicates that labels shape not only teachers' expectations, but also students' self-perceptions.¹⁰ A child who thinks they can't learn abstractly or verbally because "their brain isn't wired that way" is internalizing nonexistent limits. Neuromyths thus directly affect identity formation in harmful ways. This is true even more so for students whose identities have already been ill-affected in other ways by marginalization. Eliminating deterministic labels is an ethical necessity. However, teachers cannot abandon interpretation altogether. Care requires attentiveness to difference. Teachers must recognize that students vary in background, habits, motivation, and cultural experiences. These differences actually make up how students engage with tasks. Neuroscience does not deny heterogeneity. It pigeonholes it. By contrast, an edu-myth framework of teacher as researcher opens opportunity for understanding students as the individuals they are and the persons they are becoming. Personalization of teacher-student interaction preserves the ethical impulse to attend to particularity whilst also allowing for the rejection of false explanatory mechanisms that seek too easily and readily to categorize students into kinds. ‘Teacher as researcher’ allows teachers to respond to student differences without reducing students to categories.

The distinction between acknowledging difference and essentializing identity also clarifies a flaw in the social dimension of neuromyths. Addams reminds us that symbolic narratives become harmful when they promote inequality. Students from nondominant linguistic and cultural backgrounds risk being disproportionately labeled as “visual” or “kinesthetic” learners because of their newness to school language and culture. Mislabeling culturally inexperienced students

¹⁰ Robert Rosenthal and Lenore Jacobson, *Pygmalion in the Classroom* (New York: Holt, Rinehart & Winston, 1968).

with neuromyths reveals, first, the limited ability of learning styles language to correctly describe a large diversity of students; and, second, implicit biases about who is capable of abstract and verbal reasoning.¹¹ When these labels are treated as scientifically grounded, they absolve educators of their responsibility to directly dismantle structural inequalities. To Addams' delight, the metaphor of teacher as researcher invites educators to ask, "What am I perceiving?" and "What assumptions underlie my interpretation?" "How do cultural narratives shape the language I use to describe students?" "What assumptions underlie my interpretation?" "How do cultural narratives shape the language I utilize to describe students?" These reflecting questions are a necessity for educators set to take a leading role in construction of their professional identity.

Conscientiously constructed professional identity also protects teachers against the commercial ecosystem that perpetuates neuromyths. Brain-based training, differentiated instruction packages, and market-based learning-style assessments all capitalize on teachers' desire for tools. These products tend to present metaphors as scientific facts, thus reinforcing misconceptions. Dewey would argue that such practices impede necessary inquiry by presenting fixed categories as unquestionable truths. Emerson would warn that accepting such a framework violates intellectual self-reliance. Addams would broadly critique the social consequences of commodifying pseudoscientific narratives. And Noddings would add that care is not a commodity that can be purchased. Neuromyths, whether imposed from outside or voluntarily purchased online, fail to distinguish between teachers' assessment of canned curricula and the presumed scientific authority with which the curricula speak of themselves. Only the former can be philosophically justified. However much hyped as scientific, every new curriculum will have to be tested in context by classroom teachers just like any other suggestion for classroom success. Teacher as researcher suggests a companion edu-myth that says, "No curriculum teaches itself." Or, restated in positive terms, "All teachers know how to write lessons that tailor curriculum to student body."

The need for teachers to become well-versed in analysis of curricula for scientific merit becomes even more apparent when looking at priorly established principles based on neuromyths. Consider the common belief that students can only remember 10% of what they read, 20% of what they hear, etc. The result is the so-called "Learning Pyramid," a model that rests on no empirical basis whatsoever.¹² However, it is able to flourish in its falsehood due to its intuitively compelling narrative about active engagement. Teachers observe that students retain more when they are able to discuss, teach others, and directly apply their knowledge. The pyramid method merely offers a quasi-quantifiable narrative that aligns with this intuition. The scientific pretense, the claim that the numbers are neuroscientifically validated, is false. The pyramid doesn't tell us anything we don't already know. It just increases the likelihood that we will misuse what truth it may contain. Nevertheless, the underlying pedagogical impulse is reasonable. Active engagement matters greatly. Teacher capacity to evaluate this pedagogical insight in classroom context would preserve the general point about the importance to learning of engagement but could discard the pseudoscientific quantification. Without fictitious numbers influencing their thinking, teachers would be encouraged to explore with their students what sorts of active engagement enhances learning in their class; rather than rely on falsely produced percentages. In a similar manner, the myth of left-brained/right-brained learners persists because

¹¹ Django Paris, "Culturally Sustaining Pedagogy: A Needed Change in Stance, Terminology, and Practice," *Educational Researcher* 41, no. 3 (2012): 93–97.

¹² Will Thalheimer, "The Learning Pyramid: The Myth, the Lie, and the Legend," *Work-Learning Research* (2015).

it resonates with cultural narratives about the opposition of creativity to logic. Teachers observe that some students gravitate towards artistic expression while others may thrive within analytical tasks. The neuromyth of hemispheric dominance offers a scientific-sounding explanation for this observation. However, scientific research shows that cognitive functions are integrated across both hemispheres.¹³ A good way to resolve this paradox is to put on hold the question of the truth or falsity of hemispheric dominance. Reinterpretation of neuromyths into edu-myths reclassifies hemispheric dominance as a hypothesis to be tested by teachers, not an article of teacher knowledge or faith. Students may differ in interest, background, and confidence, yet these differences are not solely rooted in (nor should they be restricted by false beliefs about) hemispheric dominance. Understanding neuromyths as hypotheses rather than axioms provides a distinction that works to prevent deterministic interpretations and helps to encourage teachers to cultivate cognitive capacities across domains.

Reinterpretation of neuromyths into edu-myths initiates a process of actively disentangling teacher observation from curricular explanation. That is, teachers' perceptions in class of variability, engagement, and preference among their students are sources of data for testing the scientific merit of research recommendations for classroom practice. Conversely, and even more importantly, teacher fidelity to research recommendation is decidedly *not* a criterion for effective teaching. What actually requires revision is the narrative that is used to interpret these perceptions. The two edu-myths discussed above — 1) Teacher as independent researcher and 2) No curriculum teaches itself. — present an approach that reformats all of the insights of Emerson, Dewey, Noddings, and Addams into a unified philosophical method for reconstructing educational knowledge. Emerson teaches us that metaphors need to evolve. Teachers evolve as researchers as they perfect their craft. Dewey teaches that ideas must be tested. Edu-myths insist that teachers find warrant for what and how they teach. Noddings states that interpretation carries ethical weight. Their search for warranted assertibility for their instructional decisions engages teachers in interpretation of students' individual learning strengths and learning needs. Addams shows us that narrative shapes communal meaning. Edu-myths provide communal meaning for teachers because they set standards for common knowledge among teachers. Edu-myths presume 1) All teachers know how to test education science for contextual validity and reliability. and 2) All teachers know how to write lessons that tailor curriculum to student body.

Some may say trying to save any part of neuromyths risks legitimizing pseudoscience. They contend that teachers need to rely solely on validated scientific findings, as well as discard metaphorical language entirely. However, this position rests on a misunderstanding. Even neuroscientists rely on metaphors, such as neural pathways, encoding, retrieval, etc.¹⁴ Metaphors are not only a sign of ignorance. Metaphors reach beyond what we don't know to provide at least a partial grasp of complexity we are attempting to understand. This turns the question away from whether or not to use metaphor and turns the question toward how to use metaphor in a responsible manner. Conversion of neuromyths into edu-myths suggests the safest way to use neuromyths is to treat them as a research project. In converting neuromyths into edu-myths, the general strategy has been to offer a logic broader than neuromyths that is able to transform the pseudoscience into an idea awaiting test among a group of (more promising) others. Let the better ideas emerge from the contest. Neuromyths no longer act as unquestioned axioms but remain open questions. Neuromyths become hypotheses not pronouncements. Neuromyths are as

¹³ Michael Gazzaniga, *The Ethical Brain* (New York: Dana Press, 2005).

¹⁴ George Lakoff and Mark Johnson, *Metaphors We Live By* (Chicago: University of Chicago Press, 1980).

open to test as any other candidates for classroom use that theorists and researchers generate.

III.

The philosophical work of this project — analyzing the metaphorical bridge between research and practice in teaching — has involved reconstructing the conceptual tools that educators rely on. The next logical step is to ask how well reinterpretation of neuromyths into edu-myths can function within the lived realities of educational practice. Arguing that metaphors should be refined is insufficient because abstract. What matters is whether implementation of reinterpretation is able to reshape the way teachers think, act, respond, and collaborate. Edu-myths are only able to gain legitimacy as they are able to generate desired consequences from practices that teachers are able to enact within real institutional conditions.

A first practical implication concerns how teachers are able to identify and respond to learner variability. Neuromyths such as learning styles gained traction not merely because they sounded scientific but because they were able to offer teachers an intuitively appealing explanation for the differences among students that they observe each day. Students most evidently vary in how they approach tasks, engage with content, respond emotionally, and display confidence. These differences are easily observable, pedagogically meaningful, and very much ethically significant. What neuromyths offer (falsely) is a way to be able to interpret these differences. A re-interpretive framework shifts the attention from the imagined existence of innate modality-based learning styles to careful examination of complex dynamic factors that shape behavior and motivation, prior success, and cognitive load. Even a student who appears to be a visual learner may instead be a student who, more accurately speaking, benefits from reduced linguistic demands. Perhaps a student who needs to move while in class may not be “kinesthetic” at all; but struggling with anxiety and cognitive overload. Reinterpretation encourages teachers to examine these underlying conditions rather than unquestioningly accept superficial explanations.

The reinterpretative shift has significant pedagogical consequences. Neuromyths often distort instructional planning by encouraging formulaic approaches to student diversity. However, eliminating learning styles does not mean treating all students identically. Instead, freed from neuromyths, teachers are able to focus on well-supported principles such as multimodal representation, considered as a tool for deepening comprehension as opposed to a checklist accommodation of all the stated types on an arbitrarily constructed list of “learning styles.” Teachers are freed to explore techniques such as retrieval practice, elaborative interrogation, and scaffolding to meet diverse needs.¹⁵ Dual coding theory suggests that combining verbal and visual information strengthens memory.¹⁶ Elaborative encoding recommends that connecting new ideas to prior knowledge deepens understanding; spaced and interleaved practice, then, support retention.¹⁷ When neuromyths are reinterpreted as edu-myths, they become prompts for inquiries as opposed to labels. Teachers as researchers are encouraged to then ask themselves; “What is this student responding to?” “What meaning are they making?” “What supports this deepening understanding?” These questions align in a closer manner with

¹⁵ Yana Weinstein, Megan Sumeracki, and Oliver Caviglioli, *Understanding How We Learn: A Visual Guide* (New York: Routledge, 2019).

¹⁶ Allan Paivio, *Mental Representations: A Dual Coding Approach* (New York: Oxford University Press, 1990).

¹⁷ Henry Roediger and Mark McDaniel, *Make It Stick: The Science of Successful Learning* (Cambridge, MA: Harvard University Press, 2014).

both empirical evidence and ethical commitments when compared to the rigid categories that neuromyths impose. Reinterpretation anchors teacher research within legitimate cognitive science and allows teachers to integrate science into practice flexibly and intelligently, rather than clumsily or in a simplified, mechanical manner.

A second implication concerns assessment. When teachers believe wholeheartedly in learning styles, assessments begin to function solely as criteria for categorization rather than opportunities for understanding. Students may end up completing unreliable learning style inventories that (mis)shape expectations about their abilities. Reinterpretation shifts assessment towards taking the form of a research project answered via reflective inquiry: What strategies helped this student to understand the concept? What obstacles emerged? What misunderstandings continue to persist? This approach aligns very well with Dewey's view of assessment as part of inquiry and resonates with Noddings' view of interpretation as an ethical act. Edu-myths position assessment as a means of understanding how students learn rather than as a mechanism for sorting learners into "styles" or students into "grades." A fourth implication concerns professional dialogue. Teachers frequently use learning style language as a shorthand in conversations with colleagues, families, etc. The language persists because it is intuitive and culturally embedded. Reinterpretation does not demand abandoning shared vocabulary altogether. Instead, it encourages educators to develop new terms to help better express what they are observing in their classrooms. Phrases such as "engagement pattern," "representation preference," or even "task-based response tendency" may initially feel less fluent than the pseudoscientific discourse teachers have grown used to. However, by actively resisting essentialization of students and wisely foregrounding context over identity, continued use of new language bridges into richer conversations about learning. Over time, these conceptual shifts will reshape professional culture.

Reinterpretation also has major implications for teacher preparation. Many teacher education programs operate under the assumption that providing more scientific information will eliminate neuromyths. Yet, as Dekker's findings show, this assumption is very flawed.¹⁸ Information transmission alone is unable to reshape conceptual frameworks. Teachers require extensive philosophical preparation and practice with conceptual tools for evaluating the assumptions that are embedded in educational narratives, for interrogating the metaphors they inherit, and for constructing their own metaphorical understanding of the limits of scientific knowledge. The more teacher education programs treat teachers and teachers-to-be as implementers rather than as thinkers, the more they deprive teachers of opportunity to construct cultural narratives that make learning intelligible and individualistic. If teachers are unable to recognize how neuromyths (mal)function both conceptually and culturally, they cannot adequately replace them with better and more appropriate frameworks. Therefore, philosophical inquiry is not peripheral to teacher training. Development of philosophical acumen is central to creation of teachers who are researchers and teachers who are capable of tailoring curriculum to students.

Reinterpretation of neuromyths into edu-myths, therefore, generates consequences at every organizational level: Individual practice, pedagogical design, professional culture, teacher preparation, etc. This suggests that use of edu-myths to understand teaching requires institutional reform. Neuromyths are not merely individual misconceptions. They are institutional artifacts shaped by policy, professional development, and cultural narratives. For reinterpretation to be

¹⁸ Dekker et al., "Neuromyths in Education: Prevalence and Predictors."

able to function fully, institutions must create structures that support teacher research and teacher reflection. Teachers need to know how to use research models that foreground inquiry rather than become adept at uncritical compliance. Without these intellectual support structures, teachers will continue to remain epistemically overburdened and susceptible to reductive frameworks. In a philosopher's ideal, Addams and Dewey would agree, democratic educational communities would support the intellectual growth of teachers just as they are able to support the growth of students. Reinterpretation requires institutions to reimagine the epistemic environment in which teachers work when the metaphor for 'teacher' becomes 'researcher'.

Taken all together, the practical implications of reinterpretation provide a vision of professional autonomy for teachers. Reinterpretation proposes a work culture in which teachers, using a critical methodology, are able to examine the merit for classroom use of recommended conceptual tools. Teachers are then able to comfortably integrate empirical knowledge into their practice in a responsible manner and, in turn, construct meaning collaboratively with other teacher-researchers and with students. This vision challenges entrenched structural forces such as top-down mandates, commercial pseudoscience, enforced time constraints, and the currently implemented educational epistemology of: "Hear and obey!" Neuromyths reveal not only misconceptions about the brain but also misconceptions about what educational knowledge is. Simplistic notions of evidence-based practice, which presume direct application of scientific facts to teaching, clearly suffer severe epistemic shortcomings. An edu-myth approach aligns with philosophical commitments to inquiry, autonomy, and ethical relationships. It also responds to empirical research and classroom realities. It neither clings to pseudoscience nor reduces teaching to simplified technique. It sees teachers as researchers adept at adapting educational science to learning environment.

IV.

Neuromyths should be obsolete. The question is what element of the conceptual landscape should replace them. This brings us to the final movement of the argument, what reinterpretation is able ultimately to offer as a philosophical framework for education. If reinterpretation is to serve as a philosophical framework for education, it needs to be able to provide teachers with alternative versions of metaphors. It must be able to articulate a vision of educational knowledge that honors the complexity of teaching while simultaneously maintaining fidelity to scientific evidence. It must adequately explain how educators are able to integrate empirical research, ethical standards, cultural narratives, and practical judgment without collapsing these domains onto each other. Reinterpretation of neuromyths into edu-myths ends up requiring a model of knowledge that has the ability to be cohesively dynamic, relational, and culturally grounded. In brief, edu-myths must do all the things neuromyths fail to do. Ultimately, reinterpretation must clarify what it means to "know" in education.

The epistemology implicit in neuromyths is fundamentally flawed because it treats scientific claims as isolated truths that can be directly applied to classrooms. It is assumed that the transmission model of knowledge works as follows: Neuroscientists first discover how the brain works, educators receive this information, they deploy it in their classrooms. Thus, pedagogy improves. This account of the formation of teacher knowledge ignores the interpretive work required to make knowledge meaningful within context. Dewey insists that knowledge becomes meaningful only through use, through the consequences that are generated within lived

experiences.¹⁹ Addams argues that knowledge gains force when it becomes socially situated, that is, connected to the narratives that communities use in order to make sense of experience.²⁰ Noddings stresses that understanding needs to be filtered through relational care. Emerson reminds us how conceptual tools are able to gain power through the flexibility of metaphor. Reinterpretation aligns with all of these views. Knowledge must be reconstructed by teachers, not just received by them.

Reconstruction requires teachers to reject the false dichotomy between science and metaphor. Science alone is unable to meet the epistemic demands of teaching, and metaphor alone is unable to provide reliable guidance for practice. The challenge is not choosing between science and metaphor; but integrating them responsibly. Reinterpretation allows teaching to operate at the intersection of these two epistemic forms, the scientific and the metaphoric. Reinterpretation of neuromyths into edu-myths preserves the imaginative richness of metaphor whilst grounding metaphor in empirical responsibility. The significance of this synthesis becomes clear once we consider the consequences of failing to achieve it. When metaphors are taken in a literal sense, they end up ossifying into dogma, distorting learning. When empirical findings are overextended, they become reductionist and dehumanizing. When teachers are deprived of or denied conceptual tools to evaluate the usefulness in context of scientific findings, pseudoscience fills the vacuum. Neuromyths have come to flourish because educators lack both the epistemological training and institutional support necessary to be able to carry out inquiry appropriately. Reinterpretation responds to this failure, not by shaming teachers or demanding conformity, but by empowering educators as thinkers, as interpreters, as researchers, as creators of knowledge.

‘Teacher as researcher’ is a metaphor that highlights how reinterpretation is able to illuminate the role of institutions in influencing educational epistemology. If schools end up rewarding compliance over inquiry, if professional development markets pseudoscience, if teachers lack time for reflection, then neuromyths will persist even in the face of evidence against them. Addams would advise that epistemological reform requires democratic communities of inquiry, whilst Dewey would insist that reflective practice must be institutionalized, not incidental in manner. Seeing teaching as a process of research demands systemic change. There need to be structures that support collaboration, opportunities for professional discourse grounded in inquiry, respect for teacher autonomy, and integration of philosophical reasoning into teacher preparation. Ultimately, reinterpretation is offering not simply an alternative to neuromyths; but a vision of educational knowledge grounded in humility, flexibility, and ethical relations. An approach to teaching informed by edu-myths rather than neuromyths rejects the notion that scientific authority alone is able to determine pedagogical truth and, instead, insists that truth in education emerges through teachers’ reflective engagement in classroom contexts with empirical evidence, ethical principles, and lived experience. Reinterpretation positions teachers not as passive recipients of knowledge *from* others but as active participants *with* others in construction of knowledge.

One could perhaps worry that reinterpretation concedes too much to myth itself. Yet this objection misses the point that myths are here to stay. Myths fill the vacuum left by insufficient conceptual tools. Eliminating myths without addressing the vacuum their disappearance creates invites construction of new myths, just as likely pseudoscientific as neuromyths. That’s why

¹⁹ John Dewey, *Experience and Nature* (Chicago: Open Court, 1925).

²⁰ Jane Addams, *Democracy and Social Ethics* (New York: Macmillan, 1902).

reinterpretation preserves the conceptual functions that give rise to myths while simultaneously rebuilding sturdier, more reliable frameworks for construction of myths. An edu-myth approach to teaching puts a stop to the cycle of pseudoscience by clarifying the epistemological and ethical standards that conceptual tools must meet for use in context. According to a second line of concern, some may worry that reinterpretation might be too time-consuming for teachers who are already overwhelmed by structural constraints. As odd as it may seem, this objection precisely reveals why support for the methodology of reinterpretation is necessary at the systemic level. Structural reform is not something separate from epistemic reform, but a prerequisite for it. Addams' emphasis on communal inquiry underscores that epistemology requires supportive social structures. Schools must create conditions that allow inquiry to flourish. The result will be time for collaboration, opportunities for professional dialogue, and respect for teachers' intellectual labor and hard work built right into the job descriptions of teachers.

The methodology of reinterpretation appears to be a philosophically coherent and pedagogically viable alternative to both myth preservation and science eradication. Edu-myths are able to acknowledge the complexity of teaching and provide a conceptual path for moving beyond the flawed binaries that tend to dominate discussion of neuromyths. The philosophical stakes of neuromyths extend far beyond the myths themselves. Neuromyths actively force us to confront foundational questions about how educators are to come to know, what their knowledge is for, and how meaningful knowledge gets constructed as part of the practice of teaching. Reinterpretation is able to offer a response that can honor the humanity of learners and the intellectual agency of teachers. It provides a path for being able to create, refine, and implement conceptual tools that illuminate learning rather than distort it. In doing so, this transforms the debate over neuromyths into a much broader philosophical project: The reconstruction of educational epistemology. Reinterpretation situates educational knowledge within communal narratives and institutional structures where educators, via testing and reflection, refurbish and rebuild conceptual tools for effective use in classroom context.