European International Journal of Pedagogics

TYPE Original Research
PAGE NO. 11-16
DOI 10.55640/eijp-05-08-03

Development of Logical Thinking of Future Primary School Teachers Based on The Synectics Approach

Kalekeeva Sarbinaz Turkmenbaevna

Basical doctoral student at Ajiniyoz Nukus State Pedagogical Institute, Uzbekistan

OPEN ACCESS

SUBMITED 17 June 2025
ACCEPTED 13 July 2025
PUBLISHED 15 August 2025
VOLUME Vol.05 Issue08 2025

Abstract: The preparation of primary school teachers increasingly demands pedagogical strategies that cultivate both creative fluency and rigorous logical competence. This article proposes and substantiates an instructional model for developing the logical thinking of future primary school teachers through the synectics approach, enriched with analogical materials drawn from 20th-century European prose. Synectics, with its emphasis on direct, personal, symbolic, and fantasy analogies, is positioned here not as a creativity method alone but as a structured pathway toward deductive, inductive, and abductive reasoning. The study adopts a design-based and theory-grounded methodology, synthesizing literature in cognitive psychology and pedagogy with close reading of selected prose by Kafka, Woolf, Mann, Calvino, and Camus. The result is a five-phase didactic model—Prepare, Spark, Transform, Formalize, Transfer—that integrates synectic moves with formal logic tasks and metacognitive routines. Within this framework, literary episodes function as disciplined prompts that obligate students to classify concepts, define predicates, test counterexamples, trace causal chains, and articulate valid inferences. Implications include improved alignment between creative ideation and curricular logic requirements in primary education programs, a practicable blueprint for lesson planning, and an assessment scheme that indexes growth in clarity, coherence, and justificatory depth. Limitations are acknowledged regarding linguistic and cultural variability of literary sources and the need for empirical trials at scale.

Keywords: Synectics; logical thinking; teacher education; analogy; primary education; European prose; deductive reasoning; abductive reasoning.

Introduction: Institutions that prepare primary school teachers face a persistent curricular tension between creativity and logic. On the one hand, early-grade teaching demands imaginative strategies that engage children's curiosity; on the other, the teacher's own reasoning must be clear, justified, and adaptable to multiple problem types across mathematics, language, and science. Traditional courses in logic tend to emphasize formal structures, definitions, and exercises that risk detachment from the pedagogical realities of the classroom. Conversely, methods courses that privilege creativity can under-specify the rules of inference, leaving future teachers with rich ideas but weak argumentative control. Bridging this divide requires an approach that is simultaneously generative and constrained by standards of correctness.

Synectics, first systematically described by Gordon as a method of making the familiar strange and the strange familiar through structured analogy, offers a compelling bridge. In synectics workshops, participants perform targeted shifts—direct analogies to known systems, personal analogies that invite identification with phenomena, compressed conflicts that juxtapose opposites, and fantasy analogies that loosen conventional framing. Such shifts are often viewed as devices for idea generation. Yet, when deliberately coupled with formal logical tasks, synectics can also operate as an engine of disciplined reasoning. Analogy, after all, is not the opposite of logic; it is a cognitive instrument that, when appropriately constrained, guides hypothesis formation and the testing of entailments.

The present article proposes an interdisciplinary model in which synectic routines are integrated with textual prompts from 20th-century European prose. This literary corpus is especially apt because its aesthetic strategies—defamiliarization, interior monologue, fractured perspective, symbolic economy, and moral paradox—naturally catalyze the very cognitive movements that subsequent logical formalization requires. In Kafka's metamorphic premises, Woolf's shifting focalization, Calvino's speculative architectures, Mann's dialectical conversations, and Camus's existential dilemmas, students encounter narrative tensions that demand classification, conditional analysis, and inferential discipline. The claim advanced here is not that literature "teaches logic" by osmosis, but that synectically organized work with such prose can make logic's abstractions experientially necessary, thus motivating and stabilizing formal learning.

This contribution is situated within three research streams: the psychology of reasoning; pedagogy of teacher education with emphasis on reflective practice; and literary pedagogy that uses fiction to train interpretive judgment. From cognitive perspectives elaborated by Piaget, Vygotsky, and Polya, the transition from intuitive to systematic thinking involves the coordination of representations and operations; synectics can mediate this coordination by supplying structured representational shifts that are then codified in operations. In teacher education, reflective practice emphasizes the iterative reframing of problems; a synectic move functions as a purposeful reframing whose consequences can be tracked with argumentative tools. In literary pedagogy, close reading sharpens sensitivity to ambiguity and evidence; synectics channels that sensitivity toward hypothesis formation and validation.

A core problem motivates the present work: future primary teachers often demonstrate fluent narrative inventiveness in methods courses yet struggle to articulate the validity of conclusions, to discriminate correlation from causation, or to detect hidden assumptions in curricular materials. The article addresses this problem by proposing a five-phase instructional model, delineating its cognitive rationales, and providing worked examples that bind analogical exploration to formal structures of reasoning. The goal is to show that creativity-first pedagogy need not be logic-averse and that a properly designed synectic sequence can cultivate logical thinking without diminishing spontaneity.

The aim of this study is to design and theoretically validate a synectics-based instructional model that develops the logical thinking of future primary school teachers while using 20th-century European prose as a source of analogical prompts. The specific objectives are to articulate the cognitive mechanisms by which synectic moves support deductive, inductive, and abductive reasoning; to describe a practicable module sequence suitable for teacher education courses; to demonstrate, through textual cases, how literary materials can be harnessed to generate and then formalize hypotheses; and to outline an assessment framework aligned with standards for argument quality and clarity of explanation in primary education contexts.

The research design is conceptual and design-based rather than empirical in the narrow experimental sense. It proceeds through iterative cycles of theoretical synthesis, instructional design, and analytic validation by application to representative texts. The theoretical synthesis draws on foundational literature in synectics, creative problem solving, and the psychology of reasoning. Instructional design translates this synthesis into a five-phase model with clear teacher and student roles, time allocations, and expected cognitive outputs. Analytic validation then applies the model to short

passages from Kafka, Woolf, Mann, Calvino, and Camus, not as literary interpretations per se but as demonstrations of how synectic prompts can precipitate logical tasks. The method includes crafting think-aloud protocols and modeling the transformation of informal analogies into formal structures such as propositional conditionals, syllogisms, classification lattices, and argument maps.

The material base consists of selected prose excerpts under fair use standards for educational analysis. For Kafka, the opening factual premise of "The Metamorphosis" provides a compressed conflict between human identity and insect form that provokes classification and exception handling. For Woolf, perspectival shifts in "To the Lighthouse" occasion personal and direct analogies that motivate the formalization of standpoint assumptions. Mann's dialogic density in "The Magic Mountain" supplies argumentative exchanges that are amenable to mapping into premises, warrants, and rebuttals. Calvino's "Invisible Cities," by its rule-governed variations on urban forms, invites identification of invariants and counterexamples. Camus's moral calculus in "The Stranger" foregrounds conditional reasoning about intention, consequence, and norm, suitable for propositional analysis.

Synectic procedures are operationalized through scripted prompts. A direct analogy asks students to relate a literary situation to a domain-general system, such as biological classification or logical category formation. A personal analogy invites them to "become" a character or an abstract entity and speak from within its constraints, thereby exposing tacit premises. A compressed conflict juxtaposes contradictory descriptors that students must reconcile by formulating precise definitions. A fantasy analogy overextends possibilities so that subsequent pruning becomes a demonstration of necessity and sufficiency conditions. Following each prompt, a formalization routine requires students to state assumptions, define terms, and perform explicit inferential steps.

Data in the conventional sense are not collected; instead, the method records the internal coherence and completeness of worked examples against established criteria for logical argumentation and explanatory adequacy. Validity for the design is claimed on the basis of theoretical alignment, internal consistency of transformations from analogy to formal statement, and plausibility for adoption within teacher education timetables.

The primary result of the design process is the five-phase instructional model—Prepare, Spark, Transform, Formalize, Transfer—whose phases are defined by their cognitive function and their articulation with synectic moves and logical tasks. The Prepare phase establishes a concrete anchor and goal orientation. In practice, a teacher educator introduces a short literary passage and elicits initial observations, not to reach interpretive closure but to surface intuitive generalizations. This phase deliberately encourages students to articulate impressions without immediate evaluation, ensuring a rich pool of nascent concepts that will later be organized. The cognitive virtue here is availability: students can draw on fresh observations as raw material for analogical work.

The Spark phase initiates synectic shifts. In a Kafka case, a compressed conflict is posed: a human who wakes as an insect must still be evaluated as a brother and employee. Students are asked to state, without yet arguing, what definitional criteria distinguish a human from an insect and what social roles presuppose. The activity invites both direct analogy—to biological taxonomies—and personal analogy—imagining how one might be perceived if one's observable properties changed. The cognitive function is productive disequilibrium: the analogies unsettle naive categorical boundaries sufficiently to require explicit articulation of criteria. The synectic spark therefore acts as an engine of hypothesis generation, but in a constrained environment that anticipates formalization.

The Transform phase channels analogies into intermediate representations. Students convert impressions into candidate rules, articulate necessary and sufficient conditions in natural language, and list potential counterexamples suggested by the text. In a Woolf example, shifting focalization leads to the provisional rule that description is standpoint-dependent; students then test counterinstances where descriptions remain constant across perspectives. The teacher educator coaches the use of abductive reasoning: given observed features of a narrative, what hypothesis about category membership or causal relation would best explain them? Transform is thus a hinge between creative exploration and logical structure: it makes explicit considerations of explanatory fit and parsimony.

The Formalize phase requires explicit logical work. Candidate rules become definitions expressed with the precision of necessary and sufficient conditions; hypotheses are articulated as conditionals with stated domains; arguments are mapped with premises, warrants, backing, and potential rebuttals; classification schemes are drawn as lattices that show inclusion relations; causal claims are translated into directed dependencies. In a Mann dialogue, students identify explicit premises for each interlocutor, check for contradictions, and practice reductio by assuming the

negation of a claim and deriving absurdity. With Calvino, students identify invariants across fantastical cities and reformulate them as constraints; violations are presented as counterexamples that pressure revision of the rule set. In Camus, the analysis of moral predicates, intention, and consequence becomes a propositional exercise where the truth conditions of "ought" statements are explored. Throughout, the educator insists on justification: each inferential move must be licensed by an agreed rule or an explicit assumption.

The Transfer phase moves from literary prompts to prototypical primary-grade tasks. Having practiced category definition and counterexample reasoning with Kafka, students design a science mini-lesson where children sort living things by observable features and then encounter boundary cases like bats or whales; the teacher candidate now has experience guiding a conversation from intuitive sorting to definitional clarity. After Woolf, candidates design reading lessons that teach point of view not only as an interpretive category but also as an epistemic stance; they ask children to predict how a description might change with a different narrator and then justify predictions with textual evidence. From Calvino, they learn to set up mathematics tasks that explore pattern, constraint, and generative rules: children propose fantastical rules for "number cities," then test which rules generate the observed sequences and which lead to contradictions or dead ends. The literary origin is no longer visible to the children, but the teacher's pedagogical content knowledge has been sharpened by synectic and logical practice.

Two secondary results are equally important: the articulation of cognitive mechanisms that make synectics a path into logic, and the specification of assessment criteria that index growth in logical thinking for teacher candidates. Regarding mechanisms, three are salient. First, analogy, when used deliberately, supplies candidate isomorphisms between narrative structures and logical forms; for example, the conflict between identity and appearance in Kafka naturally maps onto necessary-versus-sufficient conditions. Second, narrative ambiguity maintains multiple live hypotheses long enough to demonstrate the value of parsimony and consistency; Woolf's shifting vantage points create conditions under which competing explanations must be evaluated. Third, symbolic compression forces definition; Calvino's cities compress complex social phenomena into simple structural rules that must be articulated and tested to make sense.

The assessment framework employs analytic rubrics with indicators for clarity of definitions, explicitness of assumptions, coherence of argument structure, use of counterexample to test generalizations, and accuracy in mapping analogies to formal statements. A beginning teacher candidate might show fluent associative thinking but collapse distinct claims into a single vague assertion; a competent candidate separates claims, identifies their logical relations, and uses counterexamples to refine them; an advanced candidate anticipates likely misconceptions by crafting boundary cases and articulates rules at the appropriate level of generality for primary learners. Crucially, the rubric values the moment when a candidate recognizes that an analogy no longer fits and must be abandoned or revised; this is an index of logical maturity.

The model was designed to be time-feasible within teacher education courses that often operate on constrained schedules. Each phase can be operationalized within a 90-minute session, with short texts and focused tasks. Prepare consumes roughly ten minutes, Spark fifteen, Transform twenty, Formalize thirty, and Transfer fifteen. In programs where literature is not an explicit component of teacher training, the prose passages can be introduced as generic stimuli requiring no disciplinary background. The essential requirement is a commitment to oscillate between imaginative projection and disciplined formalization, rather than to treat creativity and logic as separate course objectives.

Potential objections and limits merit discussion. One might argue that literature's indeterminacy undermines logical training because there is no unique correct interpretation of a text. The reply is that logical training concerns the quality of reasons, not the uniqueness of conclusions; synectics with literature generates multiple defensible hypotheses that must still be evaluated for consistency, explanatory scope, and evidential support. Another concern is cultural-linguistic accessibility: European prose may not resonate with all cohorts. This is a real limitation; careful selection of short, translatable, thematically universal passages is essential, and the model permits substitution with other narratives that maintain the same cognitive affordances. A further limit is the absence of large-scale empirical validation. While the design is grounded in robust theory, its classroom efficacy awaits systematic trials with control conditions. The article therefore positions its contribution as a theoretically reasoned, practically specified blueprint to be adopted and tested.

Implications for teacher education extend beyond logic instruction. Synectics encourages candidates to become attentive to the metaphors framing curricular content. In mathematics, they learn to detect when a metaphor that aided initial understanding later misleads and to manage the transition to more precise models. In

science, they practice guiding children from imaginative hypotheses to controlled observation and rule articulation. In literacy, they integrate interpretive openness with evidential rigor, demonstrating to pupils that differing views can be adjudicated by reasons. The broader professional competence enhanced by the model is reflective equilibrium: candidates balance creativity and constraint, revising either in light of the other.

The novelty of the present work lies in repositioning synectics from a creativity technique into a scaffolded pipeline for logical development and in demonstrating that 20th-century European prose, often used to teach empathy or cultural literacy, can be repurposed as a rigorous stimulus for formal reasoning. The model articulates the intermediate steps by which imaginative shifts harden into definitions, rules, and arguments and shows how this process can be made teachable and assessable for future primary educators. By connecting synectic moves directly to logical tasks and by insisting on explicit formalization after exploratory phases, the design addresses the chronic gap between idea generation and justification in teacher preparation programs.

This article has presented a synectics-based instructional model for developing the logical thinking of future primary school teachers and has situated the model within an interdisciplinary synthesis that includes 20th-century European prose. The model's five phases—Prepare, Spark, Transform, Formalize, Transfer—organize an educational experience in which analogical creativity is not the endpoint but the entry to deductive, inductive, and abductive rigor. Through carefully chosen literary prompts, teacher candidates are invited to articulate definitions, map arguments, test counterexamples, and specify conditions under which claims hold. The design respects the imaginative demands of primary teaching while strengthening the justificatory discipline that underwrites sound instruction.

The approach is feasible for programs with limited resources, as it relies on short textual stimuli and guided discussion rather than extensive technology. It is adaptable across cultures, provided that substitute narratives preserve cognitive features conducive to analogy and hypothesis testing. While the model awaits empirical evaluation at scale, its theoretical coherence and practical clarity recommend it for pilot adoption in courses on methods, educational psychology, or curriculum design. Future work should include controlled trials that compare synectics-logic integration with conventional logic instruction, longitudinal studies tracking the carryover of candidate skills into early-career teaching, and further exploration of literary corpora beyond the European canon to enhance cultural relevance.

By bringing synectics and logic into deliberate alignment, and by using the narrative resources of 20th-century European prose to make reasoning tasks both urgent and meaningful, teacher education can better prepare graduates who are at once inventive and exacting—professionals capable of designing classroom experiences where children's imaginative hypotheses become occasions for genuine understanding.

REFERENCES

Gordon W. J. J. Synectics: The Development of Creative Capacity. — New York: Harper & Row, 1961.

Prince G. M. The Practice of Creativity. — New York: Harper & Row, 1970.

de Bono E. Lateral Thinking: Creativity Step by Step. — New York: Harper & Row, 1970.

Polya G. How to Solve It. — Princeton (NJ): Princeton University Press, 1945.

Vygotsky L. S. Thought and Language. — Cambridge (MA): MIT Press, 1986.

Bruner J. S. The Process of Education. — Cambridge (MA): Harvard University Press, 1960.

Piaget J. The Psychology of Intelligence. — London: Routledge, 1950.

Bloom B. S. (ed.). Taxonomy of Educational Objectives. Handbook I: Cognitive Domain. — New York: David McKay, 1956.

Schön D. A. The Reflective Practitioner: How Professionals Think in Action. — New York: Basic Books, 1983.

Black P., Wiliam D. Inside the black box: Raising standards through classroom assessment // Phi Delta Kappan. — 1998. — Vol. 80, No. 2. — P. 139–148.

Kafka F. The Metamorphosis / Transl. by M. Hofmann. — London: Penguin Classics, 2007.

Woolf V. To the Lighthouse. — London: The Hogarth Press, 1927.

Mann T. The Magic Mountain / Transl. by J. E. Woods. — New York: Alfred A. Knopf, 1995.

Calvino I. Invisible Cities / Transl. by W. Weaver. — London: Vintage, 1997.

Camus A. The Stranger / Transl. by M. Ward. — New York: Vintage International, 1989.

Perkins D. N. The Mind's Best Work. — Cambridge (MA): Harvard University Press, 1981.

Hmelo-Silver C. E. Problem-based learning: What and how do students learn? // Educational Psychology Review. — 2004. — Vol. 16, No. 3. — P. 235–266.

Mayer R. E. The Cambridge Handbook of Multimedia Learning. — Cambridge: Cambridge University Press, 2005.

Toulmin S. The Uses of Argument. — Cambridge: Cambridge University Press, 1958.

Shulman L. S. Those who understand: Knowledge growth in teaching // Educational Researcher. — 1986. — Vol. 15, No. 2. — P. 4–14.