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DEVELOPING PRE-SERVICE TEACHERS' DIDACTIC CREATIVITY THROUGH DESIGN-BASED LEARNING: A COMPETENCY-ORIENTED PEDAGOGICAL MODEL

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pre-service teachers, didactic creativity, design-based learning, design thinking, teacher education, pedagogical design, competency-oriented model.

АННОТАЦИЯ:

This conceptual study develops a competency-oriented pedagogical model for fostering pre-service teachers' didactic creativity through design-based learning. Didactic creativity is defined as the capacity to generate, materialize, test, justify, and refine pedagogically appropriate novel solutions to instructional problems. An integrative literature synthesis was conducted across recent research on pre-service teacher creativity, design thinking, pedagogical design capacity, problem-based learning, and digital material development. The synthesis produced a six-phase model: contextual inquiry, problem framing, divergent ideation, pedagogical prototyping, enactment and evidence collection, and reflective redesign. Four competence domains—creative problem framing, pedagogical idea fluency, prototype enactment, and evidence-informed reflection—are embedded across the phases. The model positions pre-service teachers as designers of learning experiences rather than users of fixed teaching recipes and offers an assessment logic based on process evidence and design products. Implications for teacher education curricula, microteaching, practicum, and future empirical validation are discussed.

INTRODUCTION

Teacher education increasingly operates in conditions where instructional problems are open-ended, context-sensitive, and resistant to routine solutions. Teachers must interpret learner needs, coordinate curricular goals with available resources, select or invent learning activities, and continuously adjust instruction in response to evidence. In this context,

creativity is not an ornamental professional trait. It is part of teachers' capacity to design workable learning experiences under uncertainty.

Recent scholarship has intensified attention to creativity among pre-service teachers. A systematic review covering 2014–2024 identified a growing yet conceptually dispersed field, with heterogeneous definitions and limited attention to the specific professional characteristics of pre-service teachers. Scoping evidence published in 2026 similarly indicates that teacher education initiatives can develop creativity when learning environments deliberately combine active participation, design tasks, reflection, and opportunities to produce new instructional artifacts. These findings point to a need for models that translate creativity from a broad psychological construct into observable pedagogical design activity.

Design thinking and related designerly approaches offer a promising bridge. Studies in teacher education show that engaging pre-service teachers in inquiry-based lesson design, design thinking modules, and sustained design challenges can strengthen their capacity to frame problems, generate alternatives, and produce context-sensitive instructional plans. However, many implementations remain organized around generic design-thinking stages without an explicit competence architecture for didactic creativity. The present study addresses this gap by developing a competency-oriented design-based learning model tailored to the professional work of pre-service teachers.

The study asks two questions: (1) Which competence domains constitute didactic creativity when it is viewed as pedagogical design activity? and (2) How can these domains be organized into an iterative design-based learning process suitable for teacher education courses and practicum?

MATERIALS AND METHODS

The study used an integrative literature synthesis and conceptual model-building design. The source base included recent empirical and review studies on creativity in pre-service teacher education, design thinking, pedagogical design capacity, problem-based learning, creative computing, and digital material development. International competency frameworks from OECD and UNESCO were used to contextualize creativity, agency, digital competence, and reflective professional practice.

The analysis followed four steps. First, recurring descriptions of creative teacher activity were extracted and grouped by function rather than terminology. Second, design-oriented actions were mapped onto a pedagogical problem-solving cycle. Third, overlapping actions were condensed into competence domains that could be evidenced through student behavior and design products. Fourth, the domains were aligned with an iterative learning sequence in which pre-service teachers move from understanding a context to producing and revising an instructional intervention.

The model is conceptual rather than experimentally validated. Consequently, the Results section reports the architecture generated by the synthesis, not causal effects. Future studies

should test the model through quasi-experimental or design-based research, examine inter-rater reliability of proposed rubrics, and investigate how competence growth varies across subject specializations and practicum contexts.

RESULTS

The synthesis produced four competence domains. Creative problem framing refers to the capacity to interpret an instructional situation from multiple perspectives, identify learner needs, expose hidden assumptions, and formulate a productive design challenge. Pedagogical idea fluency refers to the ability to generate multiple pedagogically plausible alternatives and combine methods, representations, interaction patterns, and resources in non-routine ways. Prototype enactment refers to transforming an idea into an observable instructional artifact or teaching episode that can be tested. Evidence-informed reflection refers to evaluating the consequences of a design decision, using feedback and observation to refine the solution, and articulating the rationale for redesign.

Phase	Core design activity	Primary competence evidence	Typical artifact
1. Contextual inquiry	investigate learners, content, constraints, and classroom conditions	perspective taking; evidence gathering	learner/context map
2. Problem framing	define a meaningful instructional challenge	reframing; identification of tensions and design criteria	design brief
3. Divergent ideation	generate and compare multiple pedagogical alternatives	idea fluency; flexibility; pedagogical appropriateness	idea portfolio
4. Pedagogical prototyping	materialize a selected solution rapidly	integration of content, pedagogy, interaction and assessment	lesson storyboard/task prototype
5. Enactment and evidence collection	test the prototype through microteaching or practicum	adaptive implementation; observation	microteaching record/feedback set
6. Reflective redesign	revise decisions based on evidence and criteria	critical reflection; justification; redesign	revised design + rationale

Phase 1 positions context inquiry before method selection. Pre-service teachers examine learners' prior knowledge, misconceptions, motivation, language resources, classroom routines, and available technologies. The output is not a lesson plan but a concise representation of the instructional ecology. This phase prevents premature fixation on familiar methods and foregrounds the principle that a creative instructional solution must be appropriate to a specific context.

Phase 2 converts contextual evidence into a designable problem. Instead of broad statements such as 'students are passive,' trainees formulate a challenge with explicit criteria—for example, how to increase participation in a mixed-attainment group without reducing conceptual depth or exceeding a forty-minute lesson. Reframing is central because the first description of a problem often reproduces assumptions that narrow the solution space.

Phase 3 separates idea generation from early judgment. Pre-service teachers are required to produce several alternatives before selecting one. Idea fluency is not treated as an end in itself; alternatives are compared against pedagogical criteria such as alignment with objectives, cognitive demand, inclusivity, feasibility, and assessment visibility. In this way, novelty is constrained by professional responsibility.

Phase 4 converts the selected idea into a low-cost prototype: a lesson storyboard, task sequence, assessment prompt, visual explanation, branching scenario, or short digital artifact. The prototype makes assumptions visible. It allows peers and teacher educators to respond to a concrete design rather than an abstract intention. Digital tools can accelerate this stage, but the model treats technology as a design resource rather than as an indicator of innovation by itself.

Phase 5 introduces enactment. Microteaching, rehearsal, role-play, or a limited practicum episode provides evidence about timing, clarity, learner participation, misconceptions, and the usability of materials. The purpose is not performance grading alone; enactment functions as a test of the pedagogical hypothesis embedded in the prototype.

Phase 6 requires evidence-informed redesign. Pre-service teachers compare intended and observed effects, identify which design decisions contributed to outcomes, and revise the prototype. A redesign memo should explain what changed, why it changed, and what evidence supported the change. This phase distinguishes didactic creativity from spontaneous idea generation because it makes iterative improvement and professional judgment explicit.

Assessment within the model uses a portfolio rather than a single final product. The portfolio contains the design brief, alternative ideas, prototype, enactment evidence, feedback, revised artifact, and redesign rationale. Such process evidence allows teacher educators to assess how a student thinks and revises, not only whether the final lesson appears polished. A rubric can therefore combine novelty, pedagogical appropriateness, coherence, adaptability, evidence use, and reflective justification.

DISCUSSION

The model is consistent with empirical findings showing that creativity in pre-service teacher education can be strengthened through deliberately designed interventions. Novak and colleagues demonstrated that a creativity-enhancement intervention in computing education improved person-, process-, and product-related creativity. Design-thinking studies have likewise reported gains in pre-service teachers' lesson design capacity and shifts in their conceptualizations of instructional design. These findings support the model's assumption that creativity is educable when learners repeatedly engage in authentic design activity rather than merely study creativity as a topic.

The proposed model extends generic design-thinking cycles in three ways. First, it defines competence evidence in specifically pedagogical terms. Second, it integrates enactment and evidence collection as a mandatory bridge between prototype and redesign. Third, it treats assessment as longitudinal evidence of design reasoning, which is particularly important in teacher education where a superficially attractive lesson plan may conceal weak pedagogical logic.

The model also aligns with problem-based learning research in teacher education. Systematic and case-based evidence suggests that authentic problems can help pre-service teachers connect pedagogical concepts with practice, but implementation requires sufficient scaffolding and reflection. Design-based learning adds an explicit production dimension: the learner must not only analyze a problem but also create, test, and improve an instructional response.

Digital and generative AI tools introduce both opportunity and risk. They can expand idea generation, accelerate prototyping, and support multimodal representations; however, they may also obscure authorship of pedagogical decisions or encourage uncritical acceptance of generated content. UNESCO's human-centered guidance implies that teacher education should make verification, transparency, privacy, and human pedagogical judgment part of design competence. Within the proposed model, AI-generated suggestions are therefore treated as inputs to be evaluated against the design brief, not as finished instructional solutions.

Several limitations should be acknowledged. The model is based on conceptual synthesis rather than direct longitudinal observation. The boundaries between competence domains may vary by subject area, and creative pedagogical performance is likely to be influenced by prior content knowledge, institutional culture, and the quality of mentoring. Empirical validation should therefore combine product rubrics, process tracing, reflective writing, observation, and, where appropriate, pre/post measures of creative self-efficacy.

CONCLUSION

Design-based learning provides a coherent architecture for developing didactic creativity because it connects creativity with the professional cycle of understanding, designing,

enacting, evaluating, and improving instruction. The proposed six-phase model—contextual inquiry, problem framing, divergent ideation, pedagogical prototyping, enactment and evidence collection, and reflective redesign—operationalizes didactic creativity through four competence domains. Its central implication is that pre-service teachers should be prepared not merely to apply methods but to function as responsible designers of learning experiences. Future empirical work should test the model across teacher education programs and establish reliable assessment procedures for competence growth.

REFERENCES

1. Baran, E., & AlZoubi, D. (2024). Design thinking in teacher education: Morphing preservice teachers' mindsets and conceptualizations. Journal of Research on Technology in Education, 56(5), 496–514. https://doi.org/10.1080/15391523.2023.2170932

2. Clark, D. B., Scott, D., DiPasquale, J. P., & Becker, S. (2024). Reframing design in education: Proposing a framework to support pre-service teachers in adopting designerly stances. Journal of the Learning Sciences, 33(4–5), 613–666.

3. Creativity and Preservice Teachers: A Literature Review of an Underexplored Field (2014–2024). (2025). Education Sciences, 15(3), 395. https://doi.org/10.3390/educsci15030395

4. Magaji, A., Adjani, M., & Coombes, S. (2024). A systematic review of preservice science teachers' experience of problem-based learning and implementing it in the classroom. Education Sciences, 14(3), 301. https://doi.org/10.3390/educsci14030301

5. Novak, E., Kuo, C.-L., Tassell, J. L., & Morris, G. (2024). Effects of a creativity-enhancement intervention on preservice elementary teachers' creativity in computing education. TechTrends, 68, 1095–1106. https://doi.org/10.1007/s11528-024-00998-3

6. Odebiyi, O. M. (2023). Design thinking: How preservice teachers develop capacity for designing inquiry-based lessons. The Teacher Educator, 58(4), 485–506. https://doi.org/10.1080/08878730.2023.2184889

7. OECD. (2019). OECD Learning Compass 2030. Future of Education and Skills 2030. Paris: OECD.

8. UNESCO. (2018). UNESCO ICT Competency Framework for Teachers. Version 3. Paris: UNESCO.

9. UNESCO. (2023). Guidance for Generative AI in Education and Research. Paris: UNESCO.

10. Making design thinking for education sustainable: Training preservice teachers to address practice challenges. (2023). Thinking Skills and Creativity, 47, 101199. https://doi.org/10.1016/j.tsc.2022.101199

11. Using design thinking for developing pre-service teachers' creativity in designing teaching plans to promote interactive learning in mathematics. (2025). Learning and Instruction, 102070. https://doi.org/10.1016/j.learninstruc.2024.102070

12. Zhou, M., Jiang, Y., & Kong, S.-H. (2026). Teacher education initiatives for developing creativity among early childhood and primary educators: A scoping review. Frontiers in Education, 11. https://doi.org/10.3389/feduc.2026.1867643

13. Shabbazova, N. X. (2026). Pedagogical opportunities for developing students' didactic creativity in the context of a pedagogical education cluster. Science and Innovation, 5(3), 405–413. https://doi.org/10.5281/zenodo.23415270