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INTEGRATING DESIGN THINKING AND INQUIRY-BASED LEARNING INTO CREATIVE PEDAGOGY TO PROMOTE STUDENT RESEARCH

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Abstract. Design thinking and inquiry-based learning are both used to engage students in open-ended problems, but they originate in different traditions: design thinking is oriented towards creating solutions for people, whereas inquiry-based learning is oriented towards answering questions through evidence. This literature-based thesis, grounded in research published since 2019, examines how the two approaches can be combined within creative pedagogy to promote student research. It argues that design thinking contributes empathy-driven problem identification, divergent ideation and rapid prototyping, while inquiry-based learning contributes hypothesis formulation, systematic testing and evidence-based conclusions. Their combination is presented as a cycle of five moves: identifying a problem, framing it as a researchable question, exploring possible solutions, testing ideas, and reflecting on the learning process. Recent reviews report that design thinking is associated with gains in creativity and problem-solving but also that its effectiveness in education is not yet firmly established, and that inquiry benefits from well-timed guidance. The thesis proposes design principles for teachers and identifies directions for empirical research. No empirical data are reported.

Keywords: design thinking; inquiry-based learning; creative pedagogy; student research; prototyping; reflection; problem framing.

Introduction and relevance.

Student research is often introduced through a fixed sequence: a topic is given, literature is reviewed, a method is applied and results are reported. Such a sequence teaches procedures but leaves little room for the creative work that precedes and accompanies research, namely noticing a problem worth investigating, imagining alternatives and revising ideas after failure. Creative pedagogy values precisely these activities; among its features, Cremin and Chappell (2021) list playfulness, problem-solving and the willingness to take risks. The question is how such creative work can be made systematic enough to count as research.

Two pedagogical approaches address complementary parts of this question. Design thinking, described by Panke (2019) as both a method and a mindset for tackling ill-defined problems in teams, helps students discover problems and generate solutions. Inquiry-based learning engages students in formulating questions, investigating them and drawing conclusions from evidence, and is supported by a large body of evidence on conceptual learning, especially when inquiry is combined with timely direct instruction (de Jong et al., 2023). Used alone, design thinking may produce attractive prototypes without evidence of whether they work, while inquiry may produce rigorous answers to questions that students did not find meaningful. Integrating them is therefore relevant for developing student research in creative pedagogy.

Aim.

The aim of this thesis is to justify theoretically how design thinking and inquiry-based learning can be combined in creative pedagogy so that students learn to identify problems, explore possible solutions, test ideas and reflect on their learning as elements of research. The thesis is conceptual and based on a review of recent literature.

Theoretical and methodological basis.

The analysis draws on reviews and studies of both approaches. Regarding design thinking, Li and Zhan (2022) reviewed studies of design thinking in K-12 education and found that most were

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short, concentrated on STEM subjects, used varied process models and relied mainly on qualitative evaluation; they concluded that evidence of effectiveness remains limited. Alvarado (2025), reviewing studies in higher education, concluded that design thinking promotes active participation, critical thinking and interdisciplinary collaboration. Guaman-Quintanilla et al. (2023) examined a compulsory design thinking course for first-year university students and reported improvements in problem-solving and creativity as rated by students, peers and facilitators. Deng et al. (2026) found that design thinking in engineering education is usually integrated at course level and is associated with creativity, collaboration, empathy and problem-solving. Regarding reflection, Lynch et al. (2021) analysed students' reflections on a design thinking course and showed that students perceived it as demanding but valuable, with some applying the approach beyond the course. Regarding inquiry, de Jong et al. (2023) argued that the effectiveness of inquiry depends on learning goals, domain and prior knowledge, and that inquiry and direct instruction are best combined rather than opposed.

Discussion.

Identifying problems. Design thinking begins with empathy: students observe and interview the people affected by a situation before defining the problem. In creative pedagogy this may mean studying how children engage with a museum exhibition or why pupils avoid a school art activity. Inquiry-based learning then adds a crucial step: the problem defined through empathy is reformulated as a researchable question or hypothesis. This conversion from need to question marks the point at which creative exploration becomes research.

Exploring possible solutions. Ideation in design thinking deliberately postpones judgement and seeks many alternatives, which corresponds to the playful and risk-taking dimension of creative pedagogy. Inquiry contributes discipline by asking which solutions are plausible in light of existing knowledge and how each could be evaluated. Teachers can require that every shortlisted idea be accompanied by a prediction of its expected effect, so that ideas become testable propositions.

Testing ideas. Prototyping makes ideas concrete at low cost, and inquiry turns prototype trials into small investigations with defined criteria, data collection and comparison. For instance, two versions of a learning game can be tried with peers, and observations can be recorded against criteria agreed in advance. Because novice students may not yet know how to design a fair test, brief direct instruction on data collection at this point is consistent with the argument by de Jong et al. (2023) that guidance should be timed to learners' needs.

Reflecting on learning. Both approaches are iterative, but iteration does not automatically produce learning. Structured reflection at the end of each cycle should address three questions: what the evidence showed, how the problem definition changed, and what the student learned about the research process itself. The experience reported by Lynch et al. (2021) suggests that reflection also helps students recognise when an approach can be transferred to new contexts. Because evidence on design thinking in education is still emerging (Li & Zhan, 2022), reflections and prototype records can also serve as data for teachers' own classroom research.

Conclusion and practical implications.

The literature suggests that design thinking and inquiry-based learning are complementary: design thinking supplies problem discovery, divergent ideation and prototyping, while inquiry supplies question formulation, systematic testing and evidence-based conclusions. Combined within creative pedagogy, they can make student research both meaningful and rigorous, although this proposition still requires empirical testing. For practice, the analysis implies: (1) beginning projects with empathy-based fieldwork before defining the problem; (2) requiring students to convert the defined problem into a researchable question; (3) linking each idea to a prediction that can be tested; (4) providing short, well-timed instruction on data collection during prototyping; and (5) building structured reflection into every iteration and assessing it. Future studies could examine whether this

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integrated cycle develops students' research skills more effectively than design thinking or inquiry used separately.

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