Chapter 6
Sociotechnical Civics Across P–20 Ecologies Through Simulation Praxis and AI-Mediated Argumentation:
Transdisciplinary Architecture for Civic Reasoning

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ABSTRACT

This chapter proposes a cradle to university architecture for civics and media learning that fuses learning science, disciplinary epistemics, and sociotechnical governance. It operationalizes lateral reading, Toulminic argumentation, and deliberative praxis through reusable kernels, device light mirrors, and Universal Design for Learning. A banded curriculum, a method matrix, and authentic assessment with consequential validity and inter-rater reliability are specified, including construct maps, anchor sets, and generalizability logic. Responsible AI appears as bounded scaffold with disclosure, provenance capture, and privacy by design. Implementation science, coaching cadences, equity audits, and policy levers render scale tractable. The framework converts abstract mandates into auditable routines that cultivate credibility judgment, feasibility analysis, and public communication while safeguarding fairness, access, and authorship.

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1. INTRODUCTION

1.1 Problem Space and Purpose

Contemporary social studies across primary through higher education often defaults to encyclopedic coverage that crowds out inquiry, deliberation, and public-facing production. Information ecosystems now function through opaque ranking, personalization, and virality that reward speed over verification and sensationalism over proportionality (Alam & Mohanty, 2024; Kos & Mažgon, 2025; Núñez, 2025). Learners confront mixed-format evidence streams where text, image, audio, data visualizations, and machine-generated language cohabit, which raises the bar for epistemic vigilance, ethical discernment, and argumentation skill. Classrooms also operate under real constraints that include limited time, uneven device access, and accountability regimes that privilege short-answer recall over civic participation and media forensics (Savrani et al., 2025; Nocera et al., 2024; Vargas et al., 2024). The purpose of this chapter is to specify a coherent pathway that integrates disciplinary literacies, civic reasoning, simulations, and audience-aware writing with responsible uses of artificial intelligence as scaffolds for planning, feedback, and revision. The pathway is designed for device-rich and device-lean contexts alike and is articulated as a cumulative architecture that tightens alignment among outcomes, activities, and authentic assessments. It clarifies constructs, secures quality through moderation and reliability routines, and embeds equity and accessibility as first-order design requirements. The chapter adopts a narrative review method and synthesizes practice-relevant constructs into a design that program teams can adopt, adapt, and evaluate at scale.

1.2 Rationale and Significance

Civic life now depends on capacities that are neither incidental nor intuitive. Learners require routines for lateral reading, source provenance checks, probabilistic reasoning, and evidence synthesis across heterogeneous media. They also require dialogic competence for disagreement management and collaborative problem solving in pluralistic settings. Teachers require tractable designs that fit within ordinary timetables, travel light in resourcing, and yield defensible evidence of growth (Leaton Gray & Cukurova, 2024; Doğan et al., 2025; Dumagay et al., 2025). Systems require assessment ecosystems that can audit quality without suffocating innovation, along with governance mechanisms that protect privacy, accessibility, and academic integrity in classrooms that experiment with artificial intelligence as a writing copilot and thinking partner. The significance of this chapter lies in its convergence of learning science, disciplinary reasoning, and sociotechnical gover-