Heritage: Journal Of Social Studies, Vol. 7, No. 1 (2026)
DOI: 10.35719/hrtg.v7i1.210

# Civic Knowledge, Skills, and Dispositions in Digital Learning Contexts: A Systematic Review

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**Article History:** Submitted: February 6, 2026; Revised: April 8, 2026; Published online: June 29, 2026

**Abstract**
Digital technologies have transformed how students develop civic competencies in higher education. This systematic review synthesizes empirical evidence on civic learning outcomes across digital platforms and identifies digital learning modalities that most effectively foster civic knowledge, skills, and dispositions. Following PRISMA guidelines, 58 peer-reviewed articles (2014–2024) from Scopus, Web of Science, and ERIC were analyzed using narrative thematic synthesis and effect size comparison (Cohen's d). Interactive digital modalities, including online discussions, simulations, and collaborative platforms, produced moderate to large effects (d = 0.48–1.12) on civic skills and dispositions, whereas content-delivery approaches showed only small effects (d = 0.18–0.43), primarily on knowledge acquisition. However, most studies relied on self-reported outcomes measured within four weeks, with considerable methodological heterogeneity and frequent use of non-validated instruments, limiting conclusions about long-term behavioral change. Three civic competency domains emerged: cognitive, participatory, and affective. The review highlights that the effectiveness of digital learning depends more on interaction design than on technology type, with student-to-student and student-to-content interactions serving as stronger predictors of civic learning outcomes than specific digital platforms.

***Keywords*** **:** civic education, digital learning, online education, civic competencies, systematic review

**Abstrak**
Teknologi digital telah mengubah cara mahasiswa mengembangkan kompetensi kewargaan di pendidikan tinggi. Tinjauan sistematis ini mensintesis bukti empiris mengenai hasil pembelajaran kewargaan pada berbagai platform digital serta mengidentifikasi modalitas pembelajaran yang paling efektif dalam mengembangkan pengetahuan, keterampilan, dan disposisi kewargaan. Berdasarkan pedoman PRISMA, sebanyak 58 artikel peer-review periode 2014–2024 dari Scopus, Web of Science, dan ERIC dianalisis menggunakan sintesis tematik naratif dan perbandingan ukuran efek (Cohen's d). Hasil menunjukkan bahwa modalitas digital interaktif, seperti diskusi daring, simulasi, dan platform kolaboratif, menghasilkan ukuran efek sedang hingga besar (d = 0,48–1,12) terhadap keterampilan dan disposisi kewargaan, sedangkan pendekatan berbasis penyampaian konten hanya memberikan efek kecil (d = 0,18–0,43), terutama pada peningkatan pengetahuan. Namun, sebagian besar penelitian menggunakan hasil self-report dengan pengukuran jangka pendek, disertai heterogenitas metodologis dan penggunaan instrumen yang belum tervalidasi, sehingga membatasi kesimpulan mengenai perubahan perilaku jangka panjang. Tinjauan ini mengidentifikasi tiga domain kompetensi kewargaan, yaitu kognitif, partisipatif, dan afektif. Temuan utama menunjukkan bahwa efektivitas pembelajaran digital lebih ditentukan oleh desain interaksi daripada jenis teknologi yang digunakan, dengan interaksi antarmahasiswa dan antara mahasiswa dengan konten menjadi prediktor yang lebih kuat terhadap hasil pembelajaran kewargaan.

**Kata kunci:** pendidikan kewarganegaraan, pembelajaran digital, pendidikan daring, kompetensi kewargaan, tinjauan sistematis

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## Introduction

Civic education prepares students to participate effectively in democratic societies through developing knowledge, skills, and dispositions necessary for informed citizenship (Alscher et al., 2022). Higher education institutions bear primary responsibility for cultivating these competencies in emerging adults who will shape democratic futures (Romli et al., 2022). Digital technologies now mediate much of this civic learning, particularly following rapid online learning expansion during the COVID-19 pandemic (Haryanto et al., 2021). Over 7.3 million students in the United States alone enrolled in exclusively online courses in 2020, with millions more in hybrid formats combining face-to-face and digital instruction (Y. Liu et al., 2022). This transformation raises fundamental questions about how digital contexts support or constrain civic learning outcomes.

Digital civic education parallels broader online learning trends but presents distinctive challenges. Unlike technical skill acquisition or content mastery in fields like mathematics or science, civic learning requires developing normative commitments, engaging across difference, and cultivating democratic dispositions alongside cognitive competencies (Stokamer & Clayton, 2023). Research on online learning effectiveness shows mixed results across disciplines, with some meta-analyses finding equivalence to face-to-face instruction while others identify significant variations by subject matter and pedagogical approach (Miftakhu Rosyad & Mahamood, 2026). However, these broad syntheses typically exclude or underrepresent civic education, leaving educators without clear guidance for designing digital civic learning experiences.

Previous research on digital civic education has examined specific technologies or platforms in isolation. Studies have explored social media use for political engagement (Dinia et al., 2022), online deliberation platforms for democratic dialogue, and digital games for civic learning (Zhao et al., 2021). These investigations provide valuable insights into particular tools but do not address broader questions about digital learning effectiveness across modalities (Biesta, 2014). Existing literature shows three significant limitations. First, most studies focus on K-12 contexts rather than higher education, despite distinct developmental and institutional differences (Taylor & Rouillard, 2021). Second, research typically examines single platforms or tools without comparative analysis across digital modalities. Third, studies often assess immediate attitudinal outcomes rather than sustained behavioral engagement or skill development (Naval et al., 2022).

Several reviews have examined related domains but leave critical gaps unaddressed. Z.-Y. Liu et al. (2020) provided comprehensive meta-analysis of online learning effectiveness across subjects but included minimal civic education research. Joosten & Cusatis (2020) reviewed digital participation and political engagement but focused on social media use rather than structured learning environments. Widiatmaka & Kurniawan (2023) review of digital media and civic learning emphasized youth contexts with limited attention to higher education or pedagogical design features. Critically, no systematic review has synthesized empirical evidence specifically on civic competency development across digital learning modalities in higher education, examining which platform features and pedagogical approaches effectively support multidimensional civic outcomes. Table 1 presents a systematic comparison of existing reviews against the current study, clarifying the specific gaps this work addresses:

**Table1.** Systematic Comparison of Existing Reviews and the Present Study

| Review Study | Scope | Civic Focus | HE Context | Interaction Design | Domain Mapping |
|---|---|---|---|---|---|
| Z.-Y. Liu et al. (2020) | Online learning (multi-subject) | Minimal | Yes | No | No |
| Joosten & Cusatis (2020) | Digital participation | Social media only | Partial | No | No |
| Widiatmaka & Kurniawan (2023) | Digital media & civic learning | Yes (youth) | Limited | No | No |
| **Present Study** | **Civic learning in digital HE** | **Comprehensive (cognitive, participatory, affective)** | **Yes (exclusive)** | **Yes (primary focus)** | **Yes (3-domain mapping)** |

The research gap this study addresses operates across three dimensions. First, no comprehensive synthesis exists of empirical studies examining civic learning effectiveness in digital higher education contexts, leaving instructors without evidence-based guidance for platform selection and course design (Eriza Zuhry et al., 2024). Second, the relationship between specific digital learning features (synchronous versus asynchronous, individual versus collaborative, passive versus interactive) and civic competency outcomes remains underexplored and poorly understood (Abubakari et al., 2023). Third, comparative evidence across the three civic competency

domains (cognitive, participatory, affective) has not been systematically mapped, limiting understanding of whether digital contexts differentially support knowledge acquisition versus skill development versus dispositional change (Hidayatullah & Setiawan, 2024).

This review addresses these gaps through systematic PRISMA-guided synthesis of empirical research on digital civic learning in higher education. Unlike narrative reviews relying on selective discussion, this study employs transparent procedures for study identification, quality assessment, and evidence aggregation. The focus on civic competency domains and digital interaction features responds directly to practitioners' needs for actionable guidance on effective digital pedagogy. By synthesizing effect sizes across studies and identifying design features that moderate outcomes, this review provides nuanced understanding of not only whether digital civic education works but how specific design choices influence learning across competency domains.

The distinctive contributions of this review are positioned around two key analytical innovations that differentiate it from prior work: (1) an interaction-design perspective that moves beyond technology-type comparisons to examine how specific interaction features synchronous/asynchronous communication, individual/collaborative structures, and passive/active engagement differentially predict civic learning outcomes; and (2) a domain-specific civic competency mapping that systematically documents whether and how digital modalities support cognitive, participatory, and affective civic development a tripartite analysis absent from all existing reviews (see Table 1). These contributions represent a substantive analytical reframing, not merely an extension of prior syntheses.

This review employs the Community of Inquiry (CoI) framework as its primary theoretical lens, supplemented by civic education theory distinguishing cognitive, participatory, and affective dimensions (Wang et al., 2021). The CoI framework, developed by (Soleh & Arifin, 2021), conceptualizes online learning as emerging from the dynamic interaction of three essential elements: cognitive presence (extent to which learners construct and confirm meaning), social presence (degree to which learners project themselves and connect with others), and teaching presence (design, facilitation, and direction of learning experiences). This framework has received extensive empirical support across disciplines and provides analytical structure for examining how digital design features support learning outcomes (Santhosh et al., 2025).

Applied to civic education, the CoI framework illuminates how digital environments can support the multidimensional learning required for democratic citizenship (Taylor & Rouillard, 2021). Cognitive presence relates to developing civic knowledge and critical thinking about public issues. Social presence connects to building relationships across difference and engaging in democratic dialogue (Exintaris et al., 2023). Teaching presence encompasses intentional design of civic learning experiences and facilitation of civic inquiry (Eriza Zuhry et al., 2024). This framework predicts that effective digital civic education requires deliberate attention to all three elements rather than focusing narrowly on content delivery or technology features.

The review also draws on civic education scholarship distinguishing three competency domains. The cognitive domain encompasses factual knowledge about government and political processes, understanding of democratic principles, and critical thinking about civic issues (Miftakhu Rosyad & Mahamood, 2026). The participatory domain includes skills for democratic engagement such as deliberation, organizing, advocacy, and collaborative problem-solving (Pradipa et al., 2025). The affective domain comprises attitudes toward civic participation, sense of civic efficacy, and development of civic identity. This tripartite framework, supported by extensive research in civic education, provides structure for analyzing how digital learning contexts differentially support various competency dimensions.

This systematic review offers four distinctive contributions advancing scholarship on digital civic education. First, rather than claiming to be the 'first' review on the topic, this study's primary contribution lies in its interaction-design analytical lens: it is the first synthesis to systematically examine how specific digital interaction features not technology types predict civic outcomes across three competency domains. This methodological rigor enables more confident conclusions than existing narrative reviews. Second, the review explicitly examines relationships between digital interaction features (synchronous/asynchronous, individual/collaborative, passive/interactive) and civic outcomes across the three competency domains, revealing which design characteristics most effectively support different learning goals. Third, by synthesizing evidence across diverse digital modalities (learning management systems, video platforms, discussion forums, simulations, games, social media), the review identifies common effectiveness principles rather than platform-specific recommendations, providing guidance applicable across rapidly changing technological landscapes. Fourth, the review deliberately examines methodological quality and temporal dimensions of outcome assessment, providing transparent analysis of evidence strength and identifying where claims exceed available support. This systematic literature review addresses two primary research questions:

1. What evidence supports the effectiveness of different digital learning modalities for developing civic knowledge, skills, and dispositions in higher education contexts?

2. How do specific digital interaction features (synchronous versus asynchronous communication, individual versus collaborative activities, passive versus active engagement) differentially influence civic competency development across cognitive, participatory, and affective domains?

## Method

### Research Design

This study employed systematic literature review methodology following PRISMA guidelines (Xiao & Watson, 2017). Systematic review methodology provides transparent, replicable procedures for identifying, selecting, and synthesizing research evidence while minimizing bias through explicit protocols (Rosyad & Khoiriyah, 2025). This approach suits research questions examining intervention effectiveness across diverse contexts and identifying patterns in empirical evidence.

In accordance with PRISMA 2020 standards, this review followed a pre-established protocol that guided all phases of the search, screening, and synthesis process. The review protocol specified inclusion and exclusion criteria, search strategies, data extraction procedures, and quality assessment thresholds prior to data collection. Adherence to this protocol ensured procedural transparency and replicability.

### Search Strategy and Selection Process

Literature searches were conducted across four major academic databases: Scopus, Web of Science, ERIC (Education Resources Information Center), and Education Source. These databases were selected to ensure comprehensive coverage of education research, with Scopus and Web of Science capturing interdisciplinary scholarship, ERIC providing specialized education research access, and Education Source offering additional education-specific coverage.

The search strategy combined controlled vocabulary and free-text terms. The complete search string was: ("civic education" OR "citizenship education" OR "civic learning" OR "civic engagement" OR "political education" OR "democracy education") AND ("digital learning" OR "online learning" OR "e-learning" OR "distance education" OR "web-based learning" OR "technology-mediated" OR "computer-mediated" OR "virtual learning") AND ("higher education" OR "university" OR "college" OR "undergraduate" OR "postsecondary").

Searches covered publications from January 2014 to October 2024. This timeframe captures the decade during which digital learning technologies matured substantially, including widespread learning management system adoption, emergence of massive open online courses (MOOCs), social media platform evolution, and pandemic-driven online learning expansion. Language restrictions limited inclusion to English-language publications due to research team linguistic capabilities.

The complete search and selection process is presented in both tabular form (Table 1) and as a PRISMA flow diagram (Figure 1) in accordance with current PRISMA 2020 visual reporting standards. Figure 1 presents the visual PRISMA flow diagram illustrating the full study selection process across identification, screening, eligibility, and inclusion stages. [Authors: Please insert the standard PRISMA 2020 flow diagram as Figure 1 in the final manuscript submission, generated using the PRISMA 2020 flow diagram tool available at http://www.prisma-statement.org/]. The complete search and selection process appears in Table 2.

**Table 2.** PRISMA Flow Diagram: Study Selection Process

| Stage | Process | n | Excluded | Reason for Exclusion |
|---|---|---|---|---|
| Identification | Records identified through databases | 412 | - | - |
| | Scopus | 156 | - | - |
| | Web of Science | 134 | - | - |
| | ERIC | 87 | - | - |
| | Education Source | 35 | - | - |
| Screening | Records after duplicates removed | 318 | 94 | Duplicate entries |
| | Records screened (title/abstract) | 318 | 186 | Not relevant to criteria |
| Eligibility | Full-text articles assessed | 132 | - | - |
| | Full-text exclusions | - | 74 | - |
| | | - | 28 | Not higher education focus |
| | | - | 21 | No empirical data |
| | | - | 14 | No digital learning component |
| | | - | 11 | Insufficient methodological quality |
| Included | Studies included in synthesis | 58 | - | - |
| | Quantitative studies | 34 (59%) | - | - |
| | Qualitative studies | 15 (26%) | - | - |
| | Mixed-methods studies | 9 (15%) | - | - |

Studies were included if they: (1) focused on civic education, citizenship education, or civic learning; (2) examined digital, online, or technology-mediated learning contexts; (3) involved higher education settings (undergraduate or graduate); (4) reported empirical research with clear methodology; (5) assessed civic outcomes (knowledge, skills, dispositions); and (6) were published in peer-reviewed venues.

Studies were excluded if they: (1) focused exclusively on K-12 education; (2) examined face-to-face learning without digital components; (3) were purely theoretical without empirical data; (4) did not assess civic learning outcomes; (5) lacked sufficient methodological detail; or (6) were dissertations, book chapters, or non-peer-reviewed works.

Two independent reviewers conducted screening, with inter-rater reliability calculated using Cohen's kappa ($\kappa$=0.89), indicating strong agreement. Disagreements were resolved through discussion with third-reviewer consultation when needed (n=5).

**Data Collection and Analysis**

Data extraction employed a standardized form capturing: publication information, study design, sample characteristics, digital learning modality, interaction features, civic competencies assessed, measurement instruments, key findings, effect sizes, and limitations. Two reviewers independently extracted data, with discrepancies resolved through discussion.

Analysis combined thematic synthesis and quantitative aggregation. Thematic analysis followed Braun and Clarke's (2006) six-phase approach. For quantitative studies reporting sufficient statistics, Cohen's d effect sizes were calculated using standard formulas: $d = (M_1 - M_2) / SD_pooled$. When studies reported t-values, F-values, or correlations, effect sizes were converted using established formulas (Lipsey & Wilson, 2001). When multiple outcomes appeared within the same competency domain, effect sizes were averaged. All calculations received verification by a second analyst.

Quality assessment used adapted Mixed Methods Appraisal Tool (MMAT) criteria. Studies received ratings on 4-point scales across methodological dimensions. The threshold of ≥2.5 balanced inclusiveness with quality assurance, retaining studies with adequate methodology while excluding those with substantial flaws. This threshold aligns with systematic review practices in education research. Table 3 summarizes procedures.

**Table 3.** Data Extraction and Analysis Procedures

| Component | Procedure | Reliability |
|---|---|---|
| Data Extraction | | |
| Bibliographic data | Author, year, journal, country | 100% agreement |
| Methodological details | Design, sample, data collection | 96% agreement |
| Digital modality | Platform type, interaction features | 91% agreement |
| Civic outcomes | Knowledge, skills, dispositions measured | 94% agreement |
| Quality Assessment | | |
| Quantitative (n=34) | MMAT quantitative criteria (4-point scale) | $\kappa$=0.86 |
| Qualitative (n=15) | MMAT qualitative criteria (4-point scale) | $\kappa$=0.82 |
| Mixed-methods (n=9) | MMAT mixed-methods criteria (4-point scale) | $\kappa$=0.84 |
| Inclusion threshold | Studies scoring ≥2.5 retained | 95% agreement |
| Analysis | | |
| Thematic synthesis | Six-phase analysis using NVivo 12 | 88% inter-coder |
| Effect size calculation | Cohen's d for outcomes | 97% agreement |

Digital learning modalities were categorized through iterative coding process examining platform types and interaction features. Initial categories emerged from study descriptions, then were refined through comparison and consolidation. The final taxonomy distinguishes modalities by primary interaction type rather than specific technologies, providing framework applicable across evolving platforms.

**Results & Discussion**

**Result/Fingings**

**Digital Learning Modalities and Civic Competency Outcomes**

Analysis identified six primary digital learning modalities, demonstrating varied effectiveness across civic competency domains. Interactive modalities consistently produced stronger effects than content-delivery formats, with the largest differences appearing for participatory skills and affective dispositions rather than cognitive knowledge. These findings are theoretically coherent with the Community of Inquiry framework: modalities that sustain high social presence and cognitive presence such as collaborative projects and simulations produced the strongest outcomes, while modalities primarily supporting teaching presence through content delivery showed markedly weaker effects. This pattern extends CoI theory by demonstrating its applicability

specifically within civic education, a domain where relational and values-based learning is central. Table 4 presents comprehensive findings.

**Table 4.** Digital Learning Modalities: Features and Effectiveness

| Digital Modality | Studies (n) | Participants | Primary Interaction Type | Civic Domains Assessed | Effectiveness (Cohen's d) |
|---|---|---|---|---|---|
| Asynchronous Discussion Forums | 18 | 3,247 | Student-to-student, text-based, reflective | Cognitive: 15 studies<br>Participatory: 12 studies<br>Affective: 10 studies | Cognitive: d=0.42-0.78*<br>Participatory: d=0.51-0.89*<br>Affective: d=0.38-0.72* |
| Synchronous Video Platforms | 12 | 1,856 | Student-to-student, real-time, multimodal | Cognitive: 8 studies<br>Participatory: 11 studies<br>Affective: 7 studies | Cognitive: d=0.35-0.65<br>Participatory: d=0.48-0.81*<br>Affective: d=0.44-0.76* |
| Digital Simulations/Games | 10 | 1,542 | Student-to-content, experiential, immersive | Cognitive: 9 studies<br>Participatory: 8 studies<br>Affective: 6 studies | Cognitive: d=0.58-0.94*<br>Participatory: d=0.67-1.12*<br>Affective: d=0.52-0.88* |
| Collaborative Digital Projects | 9 | 1,389 | Student-to-student, content creation, extended | Cognitive: 7 studies<br>Participatory: 9 studies<br>Affective: 6 studies | Cognitive: d=0.54-0.87*<br>Participatory: d=0.71-1.06*<br>Affective: d=0.61-0.93* |
| Social Media Integration | 5 | 784 | Student-to-student, public, networked | Cognitive: 3 studies<br>Participatory: 5 studies<br>Affective: 4 studies | Cognitive: d=0.28-0.56<br>Participatory: d=0.45-0.79*<br>Affective: d=0.38-0.68 |
| Lecture Videos/Readings | 15 (comparison) | 2,618 | Student-to-content, passive, individual | Cognitive: 15 studies<br>Participatory: 4 studies<br>Affective: 3 studies | Cognitive: d=0.18-0.43<br>Participatory: d=0.12-0.31<br>Affective: d=0.08-0.26 |

*Note: d = Cohen's d effect size. * indicates p<0.05. Effect sizes: small (0.2-0.5), medium (0.5-0.8), large (>0.8).*

Asynchronous discussion forums represented the most studied modality (18 studies, 3,247 participants). These studies, conducted predominantly at public universities in North America (14 of 18), showed moderate to large effects across all three competency domains. However, 16 of 18 studies assessed outcomes within four weeks of discussion completion, with only 2 studies conducting follow-up assessments. These follow-up studies found that cognitive gains persisted moderately (retention approximately 65-70% at six months) while participatory and affective changes showed less stability without continued practice.

Effective discussion forum implementations shared common features. Structured prompts requiring analysis of multiple perspectives produced stronger effects (d=0.68-0.89) than open-ended prompts (d=0.42-0.61). Instructor facilitation focusing on substantive engagement rather than grade compliance associated with better outcomes. Requirements for evidence-based argumentation and response to peers enhanced learning. Five studies directly compared graded versus ungraded discussions, finding no significant effectiveness differences (mean difference=0.06, p=0.54), suggesting that participation requirements matter more than grade incentives.

Digital simulations and games (10 studies, 1,542 participants) demonstrated strong effects particularly for participatory skills (d=0.67-1.12). These immersive environments, ranging from government simulations to social issue games, engaged students in experiential learning requiring decision-making and strategic thinking. Seven studies used commercially available games while three employed custom-designed simulations. Effectiveness did not differ significantly between commercial and custom platforms (mean difference=0.11, p=0.38), suggesting that pedagogical integration matters more than production quality.

Collaborative digital projects (9 studies, 1,389 participants) showed large effects across domains, particularly for participatory skills (d=0.71-1.06) and affective dispositions (d=0.61-0.93). Projects typically spanned 6-12 weeks and required students to create digital artifacts addressing civic issues. Effective projects included clear civic learning objectives, structured collaboration processes, public presentation or dissemination components, and reflective elements connecting project work to civic concepts.

Lecture videos and digital readings, included as comparison modality, showed small effects limited primarily to cognitive knowledge (d=0.18-0.43). Few studies assessed participatory or affective outcomes following passive content consumption. When assessed, effects were negligible (d=0.08-0.31). This pattern suggests that content delivery alone, regardless of digital format, provides insufficient support for multidimensional civic learning.

Comparative analysis across modalities revealed that interaction design predicted outcomes more strongly than specific technology type. Student-to-student interaction modalities (discussions, collaborative projects) and highly interactive student-to-content modalities (simulations, games) consistently outperformed passive content delivery. Effect size differences ranged from 0.32 to 0.78 depending on competency domain, with largest gaps for participatory and affective outcomes.

**Interaction Features and Competency Domain Development**

Analysis examined how specific digital interaction features related to outcomes across civic competency domains. Findings revealed that different interaction types supported different competencies, with important implications for pedagogical design. Theoretically, this domain-specific differentiation aligns with the tripartite civic education framework: the cognitive domain, which involves knowledge construction and critical analysis, responds most to structured content interaction; the participatory domain, which requires practice of deliberative and collaborative skills, depends on peer-to-peer engagement; and the affective domain, rooted in identity formation and values development, demands sustained social presence and personally meaningful encounters. This domain-specific pattern constitutes one of the study's key theoretical contributions, offering a more granular model of how CoI framework elements map onto distinct civic competency outcomes. Table 5 presents detailed findings.

**Table 5.** Civic Competency Domains: Assessment and Development Patterns

| Competency Domain | Studies (n) | Components | Assessment Methods | Effect Sizes by Modality Type | Key Interaction Features | Longitudinal Evidence |
|---|---|---|---|---|---|---|
| Cognitive (Knowledge & Critical Thinking) | 52 (90%) | Political knowledge, government systems, democratic principles, issue analysis, argument evaluation | Knowledge tests (validated: n=31; local: n=21), critical thinking measures (n=18), essay analysis (n=12) | Interactive modalities: d=0.42-0.94* Passivecontent: d=0.18-0.43 | Content depth and complexity, structured analysis tasks, evidence requirements, multiple perspective exposure | 8 studies (moderate retention 65-72% at 6 months) |
| Participatory (Skills & Engagement) | 41 (71%) | Deliberation ability, collaborative problem-solving, advocacy skills, organizing capacity, actual civic actions | Performance assessments (n=23), behavioral observation (n=8), self-reported skills (n=21), participation tracking (n=6) | Interactive modalities: d=0.48-1.12* Passive content: d=0.12-0.31 | Peer interaction frequency, collaborative tasks, authentic civic activities, skill practice opportunities, feedback mechanisms | 6 studies (skill retention 58-68% at 6 months; behavior change minimal without continued practice) |
| Affective (Attitudes & Identity) | 38 (66%) | Civic attitudes, political efficacy, civic identity, democratic values, participation intentions | Civic attitude scales (n=26), efficacy measures (n=18), identity assessments (n=12), intention surveys (n=15) | Interactive modalities: d=0.38-0.93* Passive content: d=0.08-0.26 | Social presence, community building, meaningful engagement, personal relevance, identity expression opportunities | 5 studies (attitude persistence 52-64% at 6 months; large individual variation) |

Cognitive competencies (52 studies, 90%) received the most research attention. Assessment quality varied substantially, with 31 studies (60%) using validated instruments possessing documented psychometric properties, while 21 studies (40%) employed locally-developed measures with limited validation. Knowledge tests formed the primary assessment method, supplemented by critical thinking measures and essay analysis.

Interactive modalities produced moderate to large effects on cognitive outcomes (d=0.42-0.94) while passive content delivery showed only small effects (d=0.18-0.43). This pattern held across both knowledge acquisition and critical thinking development, suggesting that interaction supports deeper cognitive processing. Key interaction features supporting cognitive development included content depth and complexity, structured analysis tasks requiring evidence-based reasoning, exposure to multiple perspectives on issues, and opportunities for elaboration through writing or discussion.

Eight studies conducted longitudinal assessment of cognitive outcomes, finding moderate retention (65-72%) at six months. Knowledge decay occurred primarily for factual details rather than conceptual understanding or critical thinking capacities. Studies employing spaced retrieval practice or cumulative assessment showed better retention than those using single end-of-course assessment.

Participatory competencies (41 studies, 71%) showed the largest effect size differences between interactive and passive modalities. Interactive approaches produced medium to large effects (d=0.48-1.12) while passive content showed negligible effects (d=0.12-0.31). This substantial gap reflects that participatory skills require practice and feedback, which passive content consumption cannot provide.

Assessment methods varied in rigor and directness. Twenty-three studies used performance assessments requiring students to demonstrate skills in controlled settings. Eight studies employed behavioral observation of actual civic activities. Twenty-one studies relied on self-reported skill assessments, while six tracked actual participation behaviors. Studies using behavioral measures reported more conservative effect estimates than those using self-report (average difference=0.28), suggesting potential overestimation in self-report studies.

Critical interaction features for participatory development included high frequency of peer interaction, collaborative tasks requiring coordination and shared decision-making, authentic civic activities connecting to real issues or communities, structured opportunities for skill practice with feedback, and explicit skill instruction alongside practice opportunities. Modalities providing these features (collaborative projects, simulations) showed strongest effects.

Six studies assessed participatory outcomes longitudinally. Skill retention rates (58-68% at six months) fell below cognitive retention rates, indicating skills require ongoing practice. Behavioral change proved particularly difficult to sustain; studies tracking actual civic participation found minimal sustained increase without continued structural supports or community connections.

Affective competencies (38 studies, 66%) received less research attention than cognitive outcomes but showed important patterns. Interactive modalities produced moderate to large effects (d=0.38-0.93) while passive content showed negligible effects (d=0.08-0.26). This pattern suggests that developing civic attitudes, efficacy, and identity requires relational and experiential components that passive content cannot provide.

Assessment relied heavily on self-report measures, with 26 studies using civic attitude scales, 18 employing efficacy measures, and 15 assessing participation intentions. Only 12 studies assessed civic identity development, typically through qualitative methods. The predominance of self-report raises questions about social desirability bias and actual dispositional change.

Key interaction features supporting affective development included strong social presence enabling students to know and connect with peers, community-building activities fostering belonging, personally meaningful engagement with issues students cared about, opportunities for identity expression and exploration, and explicit attention to values and commitments rather than skills alone.

Five studies examined affective outcomes longitudinally, finding the most variable patterns. Attitude persistence ranged from 52-64% at six months with substantial individual variation. Some students showed strengthened attitudes over time while others reverted toward baseline. Studies suggested that affective changes require ongoing reinforcement through continued civic engagement or supportive communities.

Cross-domain analysis revealed important relationships. Twelve studies examined correlations among competency domains, finding that cognitive and participatory competencies correlated moderately ($r=0.38-0.56$, $p<0.01$), while affective dispositions showed weaker relationships with skills ($r=0.24-0.42$) but stronger ties to behavioral intentions ($r=0.48-0.67$). These patterns suggest that different competencies develop through partially independent processes, with affective dispositions influencing behavioral intentions more directly than skills or knowledge alone. These cross-domain correlations carry important theoretical implications: they suggest that affective dispositions may function as a motivational gateway to civic action, while cognitive competencies alone are insufficient to drive behavioral engagement. This finding supports a sequential or integrated model of civic competency development in which affective engagement activates and sustains participatory behavior a relationship that digital learning designers should intentionally address by sequencing affective and cognitive components rather than treating them as independent learning goals.

## Discussion

The systematic evidence synthesized in this review indicates that digital learning can support civic competency development, but effectiveness depends heavily on interaction design rather than technology selection (Miftakhu Rosyad & Mahamood, 2026). Interactive modalities incorporating student-to-student or highly interactive student-to-content engagement consistently outperformed passive content delivery across all three competency domains (Foster & Yaoyuneyong, 2016). This pattern aligns with Community of Inquiry framework predictions that social and cognitive presence, not merely teaching presence through content provision, drive meaningful learning (Kadiwone et al., 2022).

The particularly large effectiveness gaps between interactive and passive modalities for participatory skills and affective dispositions (effect size differences of 0.50-0.86) reflect theoretical predictions that these competencies require relational and experiential components (Elhefni et al., 2024). Democratic deliberation skills develop through practice with feedback, not observation. Civic efficacy emerges from successful action experiences, not information transmission (Aswad, 2019). Civic identity forms through social processes and value exploration, not content consumption (Hoggan-Kloubert & Mabrey, 2022). These findings suggest fundamental limitations to purely content-delivery approaches regardless of production quality or accessibility.

The finding that interaction design matters more than specific technology type has important practical implications. Rather than seeking optimal platforms or tools, educators should focus on designing interaction patterns that support learning objectives (Batool et al., 2024). Discussion forums, video conferencing, collaborative platforms, and simulations all showed effectiveness when incorporating high-quality interaction features (Landrum et al., 2020). Conversely, each modality showed weak effects when implemented poorly. This pattern suggests that pedagogical design capability and implementation quality matter more than technology selection, though certain technologies may better afford particular interaction types.

However, several findings require cautious interpretation. The predominance of short-term outcome assessment (76% within four weeks) significantly limits conclusions about sustained competency development and behavioral change (Batool et al., 2024). The limited longitudinal evidence available reveals concerning decay patterns, particularly for participatory skills and affective dispositions requiring ongoing practice and reinforcement. Without sustained civic engagement opportunities following coursework, digital learning gains may prove ephemeral (Hwang & Chang, 2023).

The heavy reliance on self-reported outcomes (68% of studies) raises validity concerns. Studies employing behavioral measures reported effect sizes averaging 0.28 smaller than studies using self-report for comparable outcomes (Andiwatir et al., 2021). This gap suggests potential overestimation of effectiveness in the broader literature, likely reflecting social desirability bias or gaps between expressed attitudes and actual behavior. The field requires more studies assessing actual civic behaviors and skill demonstrations rather than self-reported competencies (Barikzai et al., 2024).

Assessment quality variation significantly affects confidence in findings. Studies using validated instruments with documented psychometric properties reported more conservative effect estimates than those using locally-developed measures (Suyadi, 2022). This pattern appears across competency domains but proves particularly pronounced for participatory skills and affective dispositions where assessment proves more challenging than knowledge testing (Achmad Faruk et al., 2022). The field would benefit from greater assessment standardization and instrument validation.

The limited comparative research across platforms and modalities constrains ability to provide definitive design guidance (Farrokhnia et al., 2023). While patterns suggest interactive approaches outperform passive content, questions remain about optimal combinations of synchronous and asynchronous interaction, ideal levels of structure versus flexibility, appropriate durations and intensities, and effective integration strategies for hybrid environments combining multiple modalities (Rosyad et al., 2024). Most studies examined single modalities in isolation rather than comparing alternatives or testing combinations, leaving these practical questions inadequately addressed.

Equity dimensions received insufficient attention in reviewed research. Only 8 studies (14%) explicitly examined whether digital civic learning outcomes varied by student characteristics such as prior civic knowledge, socioeconomic status, race/ethnicity, or digital access and literacy (Fries et al., 2021). Limited available evidence suggests potential inequities, with interactive modalities showing larger effects for students entering with higher prior civic knowledge and stronger digital skills (Zulyusri et al., 2023). This pattern raises concerns about digital civic education potentially widening rather than narrowing civic opportunity gaps, but current evidence remains insufficient for definitive conclusions.

The geographic concentration of research (72% from North American institutions, 18% from European institutions) limits generalizability to other contexts (Marcia & Jade, 2019). The few studies from other regions suggest potential cultural variations in effectiveness patterns. For instance, two studies from East Asian contexts found that structured, instructor-directed discussion produced stronger effects than student-directed deliberation, contrasting with North American findings (Ufua et al., 2020). These preliminary patterns suggest that cultural contexts shape optimal interaction designs, but limited evidence prevents strong conclusions about cross-cultural variation.

Regarding underlying mechanisms, this review provides limited insight into how digital interaction produces learning (Spindler, 2019). While Community of Inquiry framework offers theoretical explanation emphasizing cognitive, social, and teaching presence, reviewed studies typically did not test these theoretical mechanisms empirically (Watson, 2019). Studies measured outcomes but rarely examined mediating processes through which

interaction influences learning. Research employing mediation analysis, process tracing, or learning analytics could illuminate causal pathways and inform more precise instructional design (Aimah et al., 2020).

The finding that different interaction features support different competency domains suggests need for deliberately differentiated pedagogical approaches. Cognitive development benefits from content depth, structured analysis, and multiple perspectives (Ayertei, 2018). Participatory development requires peer interaction, collaborative tasks, and skill practice opportunities. Affective development needs social presence, personal relevance, and identity exploration (Akbar & Suyadi, 2021). Effective comprehensive civic education likely requires multiple interaction types rather than relying on single modality or approach, but optimal sequencing and combination strategies remain understudied.

This systematic review has several important limitations constraining interpretation. First, publication bias likely affects findings, as studies showing positive effects receive easier publication than null results. Second, study quality varied despite quality assessment criteria (median score 3.2, range 2.5-3.8 on 4-point scale). Common limitations included small samples (median n=94), lack of randomization (only 6 of 34 quantitative studies used random assignment), reliance on self-report (68%), and limited follow-up (only 14 studies with longitudinal assessment). Third, heterogeneity across studies limited formal meta-analysis. Studies varied in digital modalities, interaction features, civic outcomes, measures, and designs. Effect size ranges reflect both genuine effectiveness variation and measurement heterogeneity. Fourth, language restrictions to English may have introduced bias, potentially underrepresenting scholarship in other languages. Fifth, rapid technological change means recent innovations may not yet appear in peer-reviewed literature, with publication lag excluding cutting-edge practices. Finally, scope limitations excluded important dimensions including instructor preparation, institutional support, student digital literacy development, and accessibility for students with disabilities.

**Conclusion**

This systematic literature review provides the first comprehensive synthesis of empirical evidence on civic competency development in digital higher education contexts, revealing that interaction design predicts learning outcomes more strongly than technology type. Six digital learning modalities were identified with varied effectiveness across three civic competency domains: cognitive (knowledge and critical thinking), participatory (skills and engagement), and affective (attitudes and identity). Interactive modalities incorporating student-to-student or highly interactive student-to-content engagement consistently demonstrated superior effectiveness (d=0.42-1.12) compared to passive content delivery (d=0.08-0.43), with largest differences appearing for participatory and affective outcomes. The review's primary theoretical contribution lies in advancing an interaction-design analytical framework and producing the first domain-specific civic competency map across digital modalities demonstrating that CoI framework elements (cognitive, social, and teaching presence) differentially predict outcomes across the tripartite civic education model. The review's primary contribution lies in systematically documenting that digital civic education effectiveness depends on deliberate interaction design rather than platform selection, though substantial evidence limitations require cautious interpretation. Key limitations include predominance of short-term self-reported outcomes (76% assessed within four weeks), limited longitudinal behavioral evidence, assessment quality variation, geographic concentration, and insufficient attention to equity dimensions. Findings suggest that effective digital civic education requires interactive pedagogical approaches supporting cognitive, social, and teaching presence, though current evidence remains insufficient for definitive platform or design prescriptions given methodological constraints.

Based on these findings, several evidence-informed recommendations emerge for practice and policy, framed as promising directions requiring ongoing evaluation rather than definitive prescriptions. First, instructors designing digital civic education should prioritize interaction quality over technology selection, focusing on creating meaningful student-to-student and student-to-content engagement rather than seeking optimal platforms. Specific design considerations include structuring discussions to require analysis and perspective-taking, incorporating collaborative activities enabling skill practice with peer feedback, providing authentic civic engagement opportunities connecting to real issues, building social presence through community-building activities, and ensuring personal relevance supporting identity development. Second, institutions should invest in faculty development focusing on digital interaction design capabilities rather than technology training alone, recognizing that pedagogical expertise matters more than technical proficiency. Finally, policymakers should support research infrastructure enabling rigorous evaluation of digital civic education effectiveness, dissemination of evidence-based practices, and continued investigation of emerging technologies and pedagogical innovations.

Future research should address several critical priorities advancing both theoretical understanding and practical effectiveness of digital civic education. First and most urgently, rigorous longitudinal studies tracking competency development and actual civic behaviors over extended timeframes (years rather than weeks) are needed to determine whether digital learning produces sustained civic engagement rather than temporary

attitudinal changes. Such studies should employ strong research designs with comparison groups, validated behavioral measures assessed through multiple methods beyond self-report, and follow-up at multiple time points examining both persistence and change trajectories. Second, comparative effectiveness research systematically examining different digital modalities, interaction features, and pedagogical approaches using equivalent outcome measures would enable more confident recommendations about optimal design strategies. Experimental or strong quasi-experimental designs with adequate sample sizes, careful control of confounding variables, and attention to implementation fidelity would strengthen causal inference. Finally, research examining emerging technologies including artificial intelligence, virtual reality, augmented reality, and adaptive learning systems for civic education would address evolving technological landscapes, though such research should maintain focus on learning outcomes and interaction quality rather than technological novelty alone

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