

Reimagining digital citizenship through postdigital ecosystems: a polylogue across contexts

Ottavia Trevisan^{a,*}, Elizabeth Langran^b, Rhonda Christensen^c, Séverine Parent^d, Yoshiko Goda^e, Florence Michaux-Colin^f, Megan Cotnam-Kappel^g, Michelle Deschênes^d, Alison Egan^h, Eamon Costelloⁱ, Toshinori Saito^j

^a University of Padova, FISPPA Department, Via Beato Pellegrino 28, 35137 Padova, Italy

^b Marymount University, School of Education, 2807 North Glebe Road, Arlington, VA 22207, USA

^c University of North Texas, Denton, TX 76207, USA

^d Université du Québec à Rimouski (UQAR), Rimouski, QC, Canada

^e Kumamoto University, Research and Education Institute for Semiconductors and Informatics, Kumamoto, Japan

^f INSPE de l'Académie de Paris (SU), Laboratoire EDA (Université Paris Cité), Paris, France

^g University of Ottawa, Faculty of Education, Ottawa, Ontario, Canada

^h Marino Institute of Education, Dublin, Ireland

ⁱ Dublin City University, Institute of Education, Dublin, Ireland

^j Seisa University / GRED, Yokohama, Japan

ARTICLE INFO

Keywords:

Digital citizenship
Postdigital ecosystems
Polylogue
Agency
Participation
Equity
Sociotechnical contexts

ABSTRACT

This study examined the complexities of digital citizenship through a postdigital ecosystem lens, drawing on a polylogue methodology that brought together diverse perspectives across global, cultural, and institutional contexts. Using a collaboratively developed dataset of written respondent contributions, the study explored how postdigital citizenship education can be reimagined through three analytic lenses: tensions, opportunities, and ways forward. The analysis highlighted the relational and situated nature of digital citizenship and underscored how power, access, identity, agency, and technological infrastructures co-construct civic participation across learning environments. Tensions emerged through policy-practice disconnects, narrow curricula, persistent inequities in access and participation, and the contradictory role of digital technologies in educational ecosystems. Opportunities appeared in hybrid and entangled learning spaces, students' everyday digital practices, and more relational and dialogic approaches to civic learning. The paper outlines ways forward through curricular transformation, lifelong and relational learning, equity-centered design and access, ecological and relational approaches to teaching and learning, and policy development that reflects sociotechnical complexity. Rather than starting from a singular model of digital citizenship, the study offers insights from a multi-voiced inquiry for expanding conceptual understandings of citizenship education, which is in turn reoriented as a dynamic, negotiated practice within postdigital entanglements. Implications for educational policy, research, and practice are offered.

1. Introduction

Postdigital ecosystems are defined as entangled sociotechnical environments in which online and offline spaces, artifacts, and infrastructures co-shape social life, learning, meaning-making, and power relations [1]. These postdigital ecosystems reconfigure how citizenship

is experienced and enacted, posing critical questions about agency, co-participation, positioning, and justice, especially given that being a citizen means, by definition, being a participatory member of communities [2]. These critical questions challenge educators and researchers to consider how citizenship is lived, experienced, and taught in a so-called postdigital society [3].

* Corresponding author.

E-mail addresses: ottavia.trevisan@unipd.it (O. Trevisan), elangran@marymount.edu (E. Langran), rhonda.christensen@unt.edu (R. Christensen), severine.parent@uqar.ca (S. Parent), ygodakumamoto-u.ac.jp (Y. Goda), florence.colin@sorbonne-universite.fr (F. Michaux-Colin), mcotnam@uottawa.ca (M. Cotnam-Kappel), michelle.deschenes@uqar.ca (M. Deschênes), alison.egan@mie.ie (A. Egan), eamon.costello@dcu.ie (E. Costello), t-saito@gred.seisa.ac.jp (T. Saito).

<https://doi.org/10.1016/j.caeo.2026.100380>

Available online 19 May 2026

2666-5573/© 2026 Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

This paper emerges from the work of Thematic Working Group 9 (TWG9) at EDUSummIT 2025, bringing together scholars, educators, and policy-makers from diverse academic, cultural, and geopolitical contexts to explore digital citizenship. Grounded in the understanding that educational ecosystems are interwoven with material and digital components that both enable and constrain understandings of (digital) citizenship, we employed a polylogue (a structured dialogue among multiple voices) as both form and method to investigate the central research question: *How does considering postdigital ecosystems invite us to reimagine citizenship through education?*

This paper does not seek to provide a unified model of digital citizenship in education. Rather, it offers insights drawn from a multiplicity of realities in a postdigital era for educators, teachers, and students.

1.1. Purpose of the study

This collaborative research study examined how educational practices, policies, and technologies co-shape the conditions of civic participation in a world where the digital, material, and social are inextricably interwoven. The purpose of this study was to resituate digital citizenship education within the context of a postdigital society that blurs boundaries between physical and digital spaces, formal and informal learning contexts, and local and global environments [4]. The authors contend that education in a postdigital society must be framed as a relational and ecological endeavor, in which digital citizenship is not a fixed identity or discrete skill, but an evolving practice shaped through participation in hybrid sociotechnical networks.

Our polylogue method mirrors this relational and ecological framing. Through distributed authorship, in-person discussion, and online conversations across multiple platforms, we enacted an intercultural dialogue that reflects the very conditions of postdigital citizenship we intended to study. This methodological approach allowed us to draw on diverse situated perspectives while examining how *tensions*, *opportunities*, and *ways forward* emerged within postdigital educational ecosystems. As described below, this tripartite analytic framework (i.e. considering tensions, opportunities and ways forward) supported an interpretive exploration of how postdigital education ecosystems invite us to reimagine citizenship through education.

2. Context

In the following sections, we introduce the theoretical concepts that anchored our polylogue and establish the common ground from which the distinct voices of the polylogue emerged.

2.1. Digital citizenship

Digital citizenship has long been framed through individual competencies, emphasizing safe, ethical, and responsible use of technology [5]. Early definitions predominantly highlighted technological factors and digital competencies [6,7]. The International Society of Technology in Education [8] frames digital citizenship through its Standards for Students, which emphasizes managing digital identity and online behaviour, engaging empathetically and inclusively in online communities, safeguarding well-being through intentional technology use, and protecting digital privacy and personal data. These elements provide a foundational structure for ethical and responsible technology use, aiming to prevent digital misuse and exploitation while fostering safety and troubleshooting attitudes.

However, the recent rapid integration of artificial intelligence, datafication, and platformization complicates those traditional digital competency models. Participating in digital environments is now enmeshed within global infrastructures, algorithmic systems, and sociocultural power relations. Moreover, the concept of digital citizenship continues to evolve in response to shifting societal values and broader interpretations of citizenship. This shift has significant implications for

education as learners now participate in digital environments shaped not only by technological tools, but also by unequal power relations, platform architecture, and algorithmic models.

Once technologies are recognised as neither neutral nor equally distributed, the concept of digital citizenship must be reconceptualised beyond functional or behavioural competencies to instead foreground the development of critical, ethical, and participatory capacities among learners in their diverse contexts [9–12].

Observed disparities in access to (and uses of) digital technologies across different groups have consequences for individuals' agency and demonstrate that a broader social and ethical approach to digital technology is necessary [13]. Contemporary perspectives recognize the increasing complexity of collective identities and social networks [14, 15], broadening the conversation to include social justice and societal challenges [2]. These shifts call for an education that supports active citizenship and democratic participation in digital ecosystems.

From this perspective, forms of citizenship education that aim merely to produce responsible individuals should instead nurture justice-oriented citizens, individuals capable of critically analysing social structures and actively working toward collective change [13,16]. Active digital citizenship focuses on individual agency and participation in civil, social, and political aspects through informed and responsible choices that express both individual and communal identities in digital contexts [10,12]. This perspective was central to our research as we sought to explore how digital citizenship education could empower learners to become active, engaged participants in society.

Active digital citizenship involves socially constructed practices and behavioral norms that facilitate individual development and shape social values in a digital society [17]. The literature highlights the importance of technological skills combined with critical evaluation of digital content, effective online communication, and safe and responsible behavior [9,18].

Within this context, and for this polylogue, digital citizenship was understood as sitting at the nexus of individual agency, community life, contextual factors and historical positioning. In other words, digital citizenship is shaped by what individuals are able to do, the communities in which they participate, the institutional and cultural contexts where participation occurs, and the historical conditions that enable or constrain participation. It is culturally and politically mediated, rather than universally defined or experienced [5,7]. In this sense, digital citizenship is a *situated practice* that both shapes and is shaped by the context in which it is enacted. As a construct, it implies ever-evolving competences to express and enhance agency in digital ecosystems. Given the complexity of the emphasis on agency, participation, and the intertwining of social and technological dimensions between an individual and their communities, we adopted a postdigital theoretical lens.

2.2. Postdigitality

Postdigitality explores the complex entanglements between technology, culture, and social change, emphasizing that we inhabit a world that is messy, unpredictable, and characterized by a fusion of digital and analog, biological and artificial elements ([19,20], p. 325). It rejects instrumentalist and deterministic understandings of technology, instead highlighting its co-constitutive role in shaping human behaviours, values, and agency in material and digital environments simultaneously [21,22]. This perspective was especially relevant for our study because digital citizenship today unfolds within hybrid sociotechnical ecosystems, making it necessary to understand citizenship as enacted across intertwined spaces. Furthermore, postdigitality interrogates the often-invisible power structures underlying platformization, surveillance, and datafication, advocating for a critical, reflective stance on human–technology relations that centers ethics, equity, and resistance [23,24].

Digital technology has enabled new social environments that co-shape evolving and varied forms of interaction and cultural

development, often characterized as ecosystems [25,26] due to the complex interplay among technologies, social practices, and cultural elements. Merzeau [27] further refines this by describing individualized digital ecosystems shaped by algorithmic profiling and platform design. Digital spaces are then experienced as personalised territories shaped by individual and collective habits. While initially conceived within a singular digital environment, these interactions are now understood as existing across multiple, overlapping digital ecosystems [22,28]. Being a digital citizen is no longer about existing in a single digital environment, but moving across different ecosystems, both digital and analogue, with overlapping boundaries.

Örtengren [29] explores the blurring boundaries between individual spaces, but also between digital and physical realities. In this view, digital citizenship is inseparable from citizenship in the physical world, as technologies are embedded within political, economic, and cultural systems that influence who is heard, tracked, or silenced across multiple, interrelated ecosystems [26]. This complexity calls for critical reflection on power, agency, and ethics within these hybrid sociotechnical spaces, emphasizing the need for active, responsible participation in spheres shaped by evolving relationships among humans, technologies, and institutions [30].

2.3. Postdigital citizenship education

Understanding postdigital ecosystems as intertwined spaces that are globally inequitable in access, influence, and cultural meaning is crucial for education, as they shape how individuals learn to enact citizenship. Preparing learners to be postdigital citizens therefore requires a shift from technical digital skills experienced within a singular ecosystem toward digital competences infused with broader democratic values, fostering critical, participatory, and responsible engagement across multiple ecosystems [10,11,26,31]. Yet this shift is neither uniform nor value-neutral: it unfolds differently across localities, shaped by the dominant norms and communicative practices of each context.

A postdigital citizenship educational perspective positions education as a space for cultivating agency and participation amidst blurred human/non-human boundaries [30]. It is a sociotechnical participatory space where learners are supported to act thoughtfully and ethically, and to negotiate across diverse values within the complexity of digital ecologies [32].

3. Methodology

We adopted a postdigital ontology paired with a constructivist epistemology, whereby knowledge is co-constructed through dialogical interaction in digitally mediated contexts [33]. This framing also aligned with our aim to understand digital citizenship as a relational, evolving practice shaped by the entanglements of policy, culture, technology, and lived experience. Accordingly, we employed a qualitative dialogical design in which the polylogue functioned both as a methodological approach and as the primary site of inquiry, drawing on the work of Markauskaite and colleagues [[34]; see also [35]]. Rather than seeking consensus, the polylogue intentionally cultivates plurality, treating difference, contradiction, and controversy as epistemically productive.

3.1. Polylogue design and data generation

Following previous work on polylogue and collective inquiry [34, 36], particularly in the context of EDUsummIT [35], we drew on collective intelligence, the pooling of ideas, and diverse international perspectives to construct a shared discourse around the timely and complex issue of digital citizenship education. In the context of our working group, which brought together contributors from six countries, a polylogue offered a way to address potential intercultural tensions and conflicts of interest that may surface in global conversations [36].

Polylogue encourages exchange among co-authors as it relies on the heterogeneous interaction of multiple voices and knowledge produced in varied sociocultural and disciplinary contexts [37]. Through this orientation, the co-authors collectively constructed a shared perspective while intentionally valuing difference, ambiguity, and situatedness as sources of insight.

3.1.1. Participants

Participation followed a convenience–purposive sampling approach: contributors were drawn from TWG9’s existing international network of scholars and educators. While this constituted a convenience sample, the working group was intentionally diverse across disciplines, cultural contexts, and educational systems, allowing the study to generate rich, situated insights rather than statistical generalisation, consistent with dialogical, qualitative inquiry.

Participants assumed different methodological roles:

- Coordinating author.
- Author reviewer.
- Four members of the framing team.
- Five respondents.

The coordinating author facilitated communication, ensured methodological coherence, and supervised data synthesis. The author reviewer monitored process transparency, reviewing each stage for consistency and reflexivity. The framing team drafted the conceptual scaffolding, refined the guiding research questions, and collaborated in the analytic and writing phases. Respondents (who were not involved in framing) independently authored written responses to the guiding questions and later contributed to commentary and synthesis. Table 1 introduces the participants, their geographic contexts, and their methodological roles.

Ethically, participation was voluntary, and all contributors gave explicit consent for their work to be analysed within a collective authorship framework. Authorship expectations and data ownership were discussed transparently to ensure equitable recognition of intellectual contributions.

Table 1
Participants, contexts, and roles.

Participants	Geographic context	Conceptual positioning	Role in the paper (beyond coauthor)
1. Ottavia Trevisan	Italy, EU	Researcher with teaching duties	Coordinating author
2. Rhonda Christensen	Texas, USA	Research Professor with teaching duties	Framing team member
3. Alison Egan	Dublin, Ireland	Researcher, Associate Professor	Framing team member
4. Florence Michaux-Colin	France, EU	Associate Researcher; Teacher	Framing team member
5. Severine Parent	Québec, Canada	Associate Professor	Framing team member
6. Michelle Deschenes	Québec, Canada	Associate Professor	Respondent team member
7. Megan Cotnam-Kappel	Ottawa, Canada	Associate Professor and University Research Chairholder	Respondent team member
8. Eamon Costello	Dublin, Ireland	Associate Professor	Respondent team member
9. Yoshiko Goda	Fukuoka, Japan	Professor	Respondent team member
10. Toshinori Saito	Tokyo, Japan	Professor	Respondent team member
11. Elizabeth Langran	Virginia, USA	Professor	Reviewing author

3.2. Data collection process and analysis

The research process was designed to reflect the collaborative and dialogical nature of the polylogue methodology [19]. Guided by our central research question, *How does considering postdigital ecosystems invite us to reimagine citizenship through education?*, our data collection process was designed to operationalize this inquiry through a set of four interrelated prompts. Following Markauskaite et al. [34], the coordinating author distributed four open-ended questions to respondents (see below) and invited them to submit written answers individually, without access to others’ texts. This approach supported independent meaning-making and prevented premature convergence. The questions were developed by the framing team in light of our discussion at Edu-SummIT 2025 in Dublin and explicitly aligned with our central research question: 1) How do local contexts shape postdigital citizenship education?; 2) Which tensions exist in your context in relation to the connection between digital ecosystems and postdigital citizenship education?; 3) How does considering digital ecosystems invite you to reimagine citizenship in education?; and 4) What does it mean to prepare citizens in a postdigital world?

Questions one and two addressed the first part of the central research question regarding how the postdigital ecosystems we are embedded in frame our considerations. Question three, building on previous answers, prompted the reimagination of citizenship and opportunities. Here, citizenship was reconsidered not only as an educational concern, but as something shaped through education and lived beyond it. Question four extended this reflection by eliciting forward-looking perspectives on how this reimagination can be enacted in postdigital educational contexts.

After initial submissions, the coordinating author anonymised all responses, which were then blind-reviewed by the framing team and the author reviewer for clarity, coherence, and conceptual alignment. Respondents subsequently clarified or refined their texts based on this feedback. Once revisions were consolidated, the coordinating author de-anonymised the responses for collective analysis. Blind review limited interpretive bias, while re-identification was necessary to accurately acknowledge culturally and contextually situated insights.

3.2.1. Analytic process

The analytic process followed the principles of reflexive thematic analysis [38], combining top-down and bottom-up strategies. The four top-down codes (i.e., digital citizenship, postdigitality, postdigital citizenship, and postdigital educational ecosystem - Table 2) had a dual function. They were grounded in the conceptual framework of the study but had also been introduced to the respondents as part of a shared working vocabulary. This ensured a common discursive base for respondents while maintaining openness to situated interpretations. During analysis, these four categories served as initial orienting lenses, while inductive, bottom-up coding allowed new themes to emerge from participants’ narratives.

Eleven additional codes (Table 3) emerged through open coding, capturing recurrent, situated themes across narratives. Concurrent coding was used when segments expressed multiple phenomena.

Through iterative comparison and collaborative discussion, the framing team recognized that all codes aligned with one or more of three overarching analytical lenses:

- Tensions emerging in educational contexts,
- Opportunities as potential agentic spaces for improvement, and
- Ways forward to minimize tensions by leveraging opportunities to reimagine postdigital citizenship education.

Fig. 1 provides an overview of the coding structure, displaying visually how the codes emerging in the polylogue mapped across the three lenses.

A mapping phase followed in which the team examined the

Table 2
Top-down codes shared with respondents as working vocabulary.

Code	Definition
Digital citizenship	A complex, evolving concept involving individuals’ competences, rights, responsibilities, and critical engagement within digital spaces, framed by technological access, social practices, and community participation, emphasizing both agency and ethical, justice-oriented participation [10].
Postdigitality	A societal and epistemic condition characterized by the inseparability and entanglement of digital and non-digital elements in everyday life, where technology is deeply embedded in social, cultural, political, and material processes, resulting in complex, hybrid, and co-shaped environments [21].
Postdigital citizenship	The practices, responsibilities, and ethical engagements of individuals within hybrid digital-physical environments, emphasizing critical awareness, active participation, social justice, and agency across interconnected social, cultural, and technological spheres [30].
(Postdigital) educational ecosystem	A safe, inclusive, and dynamic learning environment integrating digital and non-digital modalities, formal and informal knowledge, and sociotechnical systems, designed to foster agency, critical engagement, and ethical cohabitation, while addressing inequalities in access and participation [39].

Table 3
Agreed upon codebook.

Code	Definition
Professional development	Pre-/In-service training for teachers /educators.
Lifelong learning	The diachronic dimension of learning across the lifespan and formal, informal, and non-formal contexts.
(in)equality	Issues of (in)equal access and participation related to digital, infrastructural, skill-based, linguistic, age-related, or social conditions.
School for/of life	Education conceived as both preparation for life and as lived experience, in/across/through formal, informal and nonformal contexts; Issues of transversal skills/ experiences, negotiation, belonging, recognition.
Agency	Empowerment, the capacity to act with voice and accountability, influencing both personal trajectories and shared realities.
Bronfenbrenner’s ecosystem (1994)	Micro, meso, macro contexts shaping systemically learning, participation, and citizenship.
Policy involvement	Regulatory frameworks shaping what, where, and how citizenship is taught, learned, and enacted in education.
Curriculum definition	The ways (digital) citizenship is framed in curricula in terms of knowledge, competencies, practices, and ethical orientations.
Broad participation	Collective processes of co-defining and enacting citizenship through collaboration across institutions, communities, and social actors.
Tech paradox	The dichotomic framing of technologies as salvating/ dooming, resisting/fostering binary views of technology.
Sustainability	Considerations of citizenship and technology in relation to environmental impact, infrastructures, and long-term societal viability.

distribution and co-occurrence of codes across the three lenses. Matrices were collaboratively refined in shared documents and discussed during synchronous meetings until consensus was reached. This consensus-building stage ensured that the coding frame accurately reflected the diversity of perspectives while maintaining analytic coherence.

3.2.2. Ensuring trustworthiness

Member-checking validation followed the initial thematic synthesis. The full draft of the findings section was shared with all respondents, who reviewed interpretations, clarified context-specific meanings, and

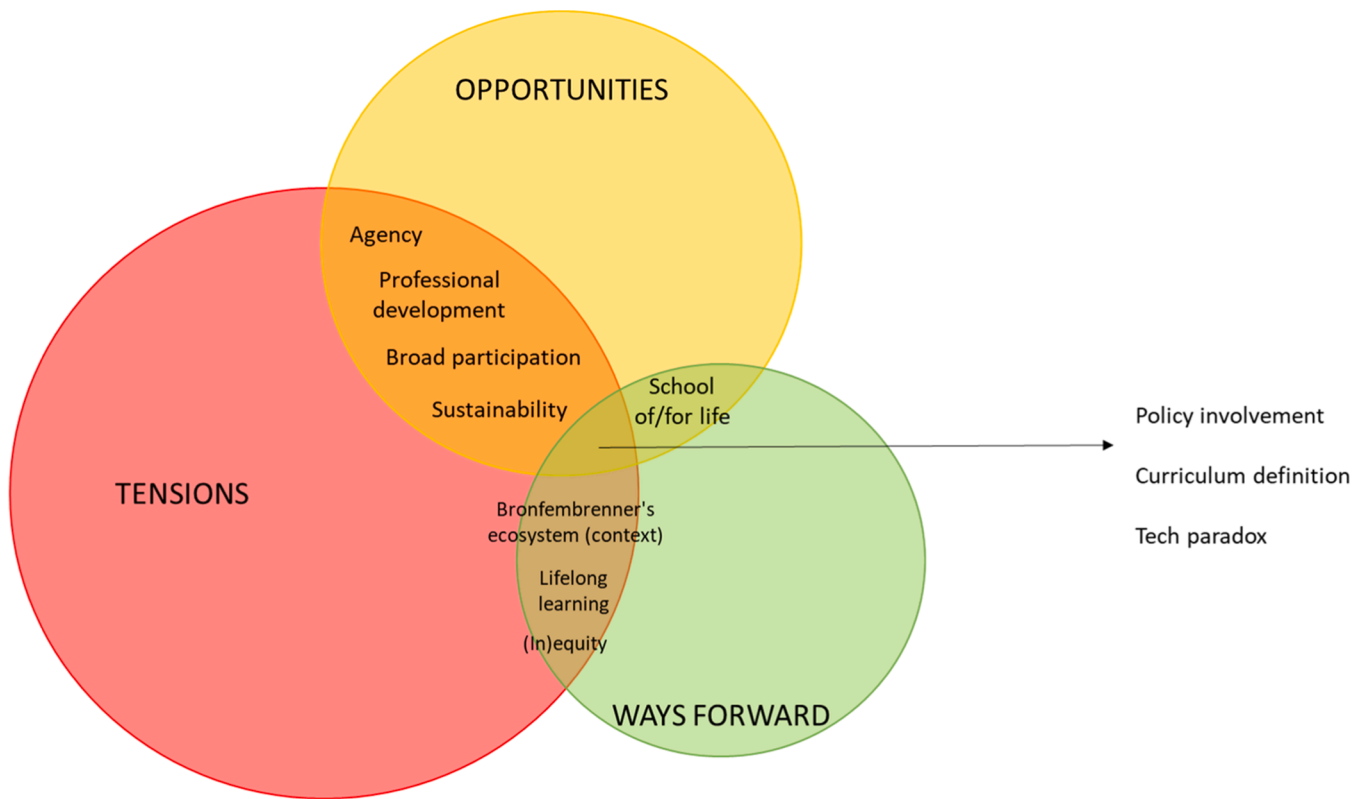


Fig. 1. Coding structure illustrating how tensions, opportunities, and ways forward intersected across analytic themes in the polylogue dataset.

suggested adjustments where needed (similar to [34]). To further ensure trustworthiness [40]:

- all analytic decisions and document versions were archived in a shared digital workspace,
- reflexive memos documented emerging interpretations and positional reflections, and
- the author reviewer validated transparency at each milestone.

This process provided a clear, auditable trail of methodological rigor while honoring the relational and dialogical nature of the polylogue approach.

4. Findings

The findings from the polylogue are organized around the interwoven tensions, opportunities, and ways forward identified across respondents' situated contexts of postdigital citizenship. The three analytic lenses revealed how respondents approached the complexity of sociotechnical ecosystems and the relational practices of citizenship in education. The distinctiveness of each respondent's perspective was retained as part of the polylogue process.

4.1. Tensions emerging in postdigital ecosystems

Respondents described a variety of tensions that shape postdigital citizenship education, mapped onto almost all of the codes (Table 4).

4.1.1. Policy, curriculum, and governance

Policies regulating digital citizenship education—what it is, where it belongs, and how it should be taught (*policy involvement* code)—often did not reflect the sociotechnical conditions shaping students' actual civic lives. As Yoshi observed, “policy narratives can imply that ‘more digital is better,’ but embodied, place-based, and analog practices [...]

Table 4

Incidence of codes within the Tension lens.

Code	Tension
Agency	✓
Broad participation	✓
Bronfenbrenner's ecosystem (context)	✓
Curriculum definition	✓
(In)equity	✓
Lifelong learning	✓
Policy involvement	✓
Professional development	✓
School for/of life	x
Sustainability	✓
Tech paradox	✓

complement digital fluency.” Megan similarly noted that “these tensions become visible in the gap between educational curricular framings and the lived realities of youth as they negotiate their civic identities in rapidly shifting, platform-driven environments.” This disconnect was compounded when reactive policy responses, such as mobile phone bans, “sidestep the critical question of how to teach young people to use these widely adopted devices for ethical participation, community-building, and civic engagement” (Eamon).

National and regional contexts further shaped digital citizenship education in ways that reflect *Bronfenbrenner's* ecological perspective. Learners may inhabit “homogeneous cultural and linguistic settings, while their digital interactions are globally entangled,” Yoshi explained, generating tensions between local norms (e.g., politeness, hierarchy, collective responsibility) and justice-oriented, participatory postdigital practices.

Policies can also produce unintended consequences. National initiatives that provide devices and connectivity in classrooms created “conditions for hybrid teaching and learning,” yet “teachers report heavy workloads and uneven opportunities to develop pedagogical uses

of ICT” (Yoshi). Moreover, curricular frameworks were found to be misaligned with the challenges youth encounter. As Megan wrote, “Curricular materials continue to emphasize safe behaviour, personal responsibility, and respectful interaction [...]. Yet research and youth accounts point to challenges that exceed individual control,” including misinformation, amplified harmful content, and persistent cyberbullying.

At the curricular level (*curriculum definition* code), digital citizenship remained underdeveloped or peripheral. Eamon pointed to Ireland’s situation, where digital citizenship “is not a core subject and exists within a system which often prioritises the subjects core to high-stakes terminal examinations.” This lower curricular status, despite policy acknowledgment, might contribute to the marginalization of digital citizenship in everyday educational practice. Yoshi noted that “MEXT’s long-standing ‘information morality’ agenda prioritizes safe and responsible technology use and rule compliance,” while Megan observed “the silence of curricula on social media as a civic environment,” despite its centrality in young people’s lives.

Overall, these tensions arose not from an absence of policy but from policy-practice disconnects, curricular narrowness, and contradictions across governance levels, which together obscured the lived realities of postdigital civic participation in education and beyond.

4.1.2. Professional learning and institutional capacity

Another cluster of tensions centers on educators’ capacity to respond to evolving digital ecosystems. To support meaningful postdigital citizenship education, teachers must navigate shifting technologies, emerging digital harms, and new civic practices within evolving socio-technical contexts; yet professional learning structures rarely keep pace (*in/equity*).

Megan noted “a tension [that] emerges from the temporal mismatch between static curricular frameworks and the pace of change in digital ecosystems. Teachers, school leaders, and parents [...] face consistent obstacles: a lack of professional development, insufficient resources, and limited institutional capacity to keep pace with ever-evolving platforms.” This mismatch, she argued, highlighted the need for dynamic, responsive approaches in postdigital citizenship education. Even when policies promote digital tool use, few included provisions for sustained pedagogical support. Yoshi underscored that “teachers already report heavy workload,” pointing to the need for “workload reform” if educators were to incorporate critical digital literacies or manage emerging challenges such as AI-driven misinformation and online harms.

These tensions pointed to a core systemic issue: postdigital citizenship education depends on robust, sustained professional learning ecosystems, not isolated training or resource allocation. These challenges were not merely technological but directly shaped how postdigital citizenship can be taught and enacted in educational settings.

4.1.3. Agency, participation, and lifelong learning

Several instances converged around the code of *agency*, both individual and collective, and the conditions that enabled meaningful civic participation in postdigital ecosystems. Agency encompasses far more than digital functionality; it involves the capacity to participate meaningfully in civic life across one’s lifespan. Michelle emphasized that “Lifelong learning, adaptability, and collaborative problem-solving are central to this dimension, ensuring that citizens are not passive consumers of technology but rather active contributors to digital cultures and societies.” Yet structural, linguistic, and social barriers frequently undermined this ideal. For instance, Megan noted that “while some French-language networks exist, they are fragile and more often private,” limiting opportunities for youth in minority-language communities to participate or mobilize.

This limitation was compounded by platform dominance (*in/equity*): “when French content is harder to find or less rewarded by algorithms, young people learn to be citizens online through English-language examples,” Megan explained. Similarly, Michelle highlighted concerns

about autonomy as essential services increasingly required digital navigation skills that not all citizens possess.

Agency also emerged as relational and collective. Toshinori argued that democratic resilience requires “robustness of intellect to not abandon dialogue,” suggesting that agency must be enacted with and alongside others. Megan added that students were often positioned as passive participants “compelled to adapt rather than shape” the digital environments they inhabit, reflecting tensions around participatory culture and power.

Finally, *lifelong* participation was uneven across age groups. Yoshi noted that older adults’ digital participation remains contingent on health literacy and social ties, revealing persistent tensions in how societies conceptualize citizenship beyond youth.

4.1.4. Equity and digital inequalities

Numerous equity-related tensions (*(in)equity* code) were evident across answers, about digital gaps, infrastructure gaps, skill gaps, and linguistic, age-based, or socioeconomic inequities. Michelle noted that “Persistent inequalities in digital competence thus intersect with, and amplify, broader social inequalities [41].” Eamon echoed this, emphasizing how socioeconomic factors, familial circumstances, and inherited dispositions “complicate or unsettle notions of straightforward agency for citizenship before a single digital byte is even introduced.”

The recent COVID-19 pandemic further exposed and deepened inequalities. Yoshi observed that despite high national connectivity at the time, “children from higher-income and more educated families had greater access to school-provided and out-of-school online education, amplifying opportunity gaps.” Michelle added that while digital ecosystems created opportunities for engagement, they simultaneously risked exclusion, particularly for marginalized groups. Equity, therefore, was not an isolated issue but a systemic tension that intersected with policy, curriculum, participation, and professional learning in shaping postdigital citizenship.

4.1.5. Digital ecosystems, technology paradoxes, and sustainability

The ambivalent discourse around technologies (*tech paradox* code) and their *sustainability* were other sources of tension. Participants noted that technology was often framed as either a threat or a solution, obscuring the entangled and complex nature of postdigital life. This tech paradox created tensions in designing learning experiences that prepared students to engage critically rather than reactively.

Environmental sustainability compounded these tensions. Eamon noted that increasing digitalization in education brought “environmental hazards of digital technology [42], from e-waste to carbon emissions.” Megan similarly emphasized “significant environmental costs in terms of energy consumption” associated with AI. These tensions illustrated the need to balance innovation with ecological responsibility, situating sustainability as a central theme in postdigital citizenship education.

4.2. Opportunities inviting us to explore further

Along the tensions abovementioned, a range of opportunities appeared in participants’ reflections, as per Table 5.

The incidence of codes and their broad overlap with tensions (Fig. 1) suggests that within paradoxes and uncertainty lie fertile spaces for ethical practice, civic participation, and educational renewal. Across the data, opportunities emerged in entangled spaces of action, in existing practices, uses, and policies, and through broad engagement and co-construction.

4.2.1. Entangled spaces of action

Participants foregrounded the interwoven nature of digital, social, and educational ecosystems, revealing opportunities for learning and enacting citizenship within the very paradoxes and contradictions of postdigital life (*tech paradox* code). The emerging opportunities

Table 5
Incidence of codes within the Opportunities' lens.

Code	Opportunities
Agency	✓
Broad participation	✓
Bronfenbrenner's ecosystem (context)	×
Curriculum definition	✓
(In)equity	×
Lifelong learning	×
Policy involvement	✓
Professional development	✓
School for/of life	✓
Sustainability	✓
Tech paradox	✓

highlighted two domains of entangled spaces where citizenship can be reimagined: within technologies themselves, and at the boundaries between school and extra curricular lives (*school for/of life* code).

Across the respondents' voices, technology may function as a space of ethical tension and negotiation. Toshinori emphasized that postdigital citizenship education "can be positioned not as siding with either extreme but as a constant attempt to seek the possibility of dialogue in a society where disparate values coexist." His reflections pointed to an opportunity to frame citizenship (education) as an ongoing search for the middle ground - a continuous redefinition of "communicative practices and online/offline boundaries."

Awareness of how "digital ecosystems cause problems like environmental destruction and data exploitation behind their conveniences" (*sustainability* code) may itself become an ethical resource. It prompts education to "cultivate a multifaceted awareness among citizens" while acknowledging "the difficulty in reconciling competing values, such as pursuing economic opportunities versus practising civic ethics, or acting with market rationality versus considering global externalities." (Eamon). For him, the purpose of education was "to nurture human beings as imperfect creatures who, while often pursuing daily life and sometimes selfish desires, attempt to make better choices."

Students "articulate nuanced understandings of digital life that adults often overlook," Megan reports. In her research, students spoke of "how online participation shapes who they are and how they are perceived," describing both positive emotions (joy, belonging) and negative states (anxiety, disconnection). In this ambivalence lie possibilities: "being ethical online thus involve[s] more than behavior; it include[s] cultivating dispositions such as respect, empathy, and authenticity in environments often marked by toxicity and misrecognition."

Michelle's reflections extended these opportunities into the realm of educational design and policy. She noted that educators must "navigate the paradox of fostering digital competence while mitigating risks of exclusion," recognizing that such navigation can expand "opportunities for participation" and support "autonomy, well-being, and civic engagement" through critical awareness.

Eamon and Megan further highlighted necessary negotiations among institutional contradictions: "we act as if learners can be severed from the digital by locking up personal devices as they enter the school gates." Instead, they suggested schools should embrace the continuum between digital and analog practices and to function as spaces where critical engagement with technology becomes integral to everyday civic learning.

These voices collectively position entanglement as a site of possibility, seeing students and educators alike as operating within overlapping systems in which tensions between agency, ethics, and systemic complexity are not to be resolved but consciously inhabited. Such opportunities require reimagining education as a space where formal, informal, and nonformal learning intertwine and enrich one another (*school for/of life* code). As Michelle stated, "digital citizenship is not a fixed status but a relational process that unfolds across overlapping

systems - educational, professional, familial, and societal." Yoshi added that educators are called to value "analog alongside digital. Postdigital education [must] recognise that meaningful participation is embodied and contextual: dialogue, craftsmanship, and physical practices in arts and sports cultivate empathy, persistence, and care - virtues that [...] sustain civic life."

4.2.2. Existing practices, uses and policies

Youth everyday practices become foundational for a reimagined approach to postdigital citizenship education. For Megan, Canadian students developed an "awareness of platform logics and sociotechnical dynamics," a critical reading of their digital environment that is "often drawn from trial and error in their own digital lives." Youth in these contexts build "a common digital culture" through their everyday engagement [43]. In Ireland, Eamon saw young people's desire for social connection, access to information, and autonomy as an opportunity that could support "more empathic, imaginative and holistic educational approaches [44]."

In Japan, Yoshi explained that early steps in digital citizenship came less from implicit shared experience and more from cultural norms, offering a shared meaning in a common ecosystem despite local-global tensions. Toshinori added that "regions with stronger traditions of civic community foster more cooperative civic participation based on norms of trust and reciprocity [45]."

Professional education communities (*professional development*) also revealed opportunities. Yoshi described how, during COVID-19, "field-level coordination [did] sustain participation and innovation," demonstrating the value of networks that bridge research, policy, and practice. Such informal investments could evolve into institutional answers through teacher training programs, such as Ireland's "What is Digital Citizenship and How to Teach it (Post-Primary)" course [46].

Bringing together educators' expertise and students' social uses could also create opportunities for a practice-oriented postdigital citizenship ecosystem grounded in institutional technical support and curricula. As Michelle proposed, such an ecosystem "entails cultivating a comprehensive set of dispositions, competencies, and responsibilities that enable individuals to engage critically, responsibly, and constructively in a digital society."

4.2.3. Broad engagement

If postdigital paradoxes could open spaces for participation, learning, and teacher professional development and a reframing of curricula around students' everyday practices can extend those openings, the co-construction of shared meaning-making around citizenship can be expanded as follows.

Across participants' answers, the shared work of building and inhabiting citizenship together emerged as a central opportunity. *Equity* was frequently identified as a necessary starting point. Eamon stated that "acknowledging diversity, equity and inclusion" was essential because these factors "impinge upon individuals at the local context." Megan cautioned that inequities "are not simply the result of poor individual choices but stemmed from systemic properties of platforms themselves," calling on educators to help learners develop "the critical literacies needed to understand and respond to structural inequities in digital ecosystems." Michelle similarly argued that "preparing just digital citizens necessitates addressing structural inequities and bridging the persistent digital divide."

Agency also emerged as a relational and situated key to postdigital citizenship. Michelle explained that cultivating digital citizenship "means encouraging learners to see themselves as co-constructors of the environments they inhabit," influencing the values and practices that shape those spaces. Yoshi echoed this view, calling for ecosystems that "enable responsible, critical, and inclusive action across hybrid digital-physical spaces."

These opportunities extended beyond classrooms into hybrid civic spaces where young people already act as citizens. As Megan wrote, "if

civic learning happens where students actually gather, in the spaces where they scroll, create, and talk,” then their languages, identities, and ways of knowing “are not peripheral” but foundational. She highlighted “platform-native practices (short-form video, memes, collaborative storytelling)” as “gateways to civic voice and collective problem-solving,” enabling ecosystems to “notice which voices are amplified or sidelined by sociotechnical systems.”

Finally, Yoshi and Toshinori emphasised the importance of spatio-temporal context (*Bronfenbrenner's ecosystem* and *lifelong learning* codes). As Toshinori wrote, “postdigital citizenship education is given a distinct interpretation that reflects the dominant values and norms of the locality,” producing “significant regional differences in both the perception and the concrete practice of this educational ideal.” Yoshi further suggested to consider the issue “as lifelong and intergenerational rather than youth-only,” and that digital citizenship education must foster “intercultural competence and critical use of translation and accessibility technologies - leveraging them to widen participation while recognising their limits and biases.”

Across these perspectives, co-construction emerged as both principle and practice: a distributed process that opens opportunities for connection across local and global contexts, and between individual learning and collective transformation. In this sense, co-construction offered a way to recognise and inhabit the ongoing negotiations through which educators, learners, and institutions can sustain more connected and just forms of democratic life.

4.3. Ways forward to reimagine citizenship through education

Sustaining ethical, just, and agentic citizens within a postdigital ecosystem requires a profound realignment of educational philosophy, one that moves beyond technical compliance toward systemic critique, relational practice, and shared meaning-making. As respondents emphasized, ignoring students' lived definitions and practices of citizenship risked preparing them for an abstract, idealized “digital world,” rather than for the actual hybrid civic environments they inhabited. This sentiment, articulated by Megan and echoed by Eamon, underscored the need for educational approaches grounded in lived practices, identities, and sociotechnical realities.

These ways forward emerged across the polylogue as curricular transformation, lifelong and relational learning, equity-centered design and access, and policy development that reflects ecological complexity (see Table 6).

4.3.1. Curriculum definition

Participants identified significant tensions in current citizenship curricula between static digital competence frameworks (*curriculum definition* code) also due to “limited institutional capacity to keep pace with changes in technological innovation” (Megan). Re-situating the civic arena within educational design thus becomes a key actionable strategy. Postdigital citizenship across the dataset calls for a conceptual shift away from individual accountability toward relational

responsibility amid systemic complexity. Curricular materials emphasizing safe behavior, personal responsibility, and respectful interaction often placed undue burden on learners, leaving “the systemic properties of platforms themselves” unexamined (Megan). Yoshi similarly observed that re-imagining citizenship requires “critical awareness of socio-technical systems.”

An actionable postdigital strategy involved extending traditional “information morality” (Yoshi) agendas toward critical digital literacies that center rights, responsibilities, privacy, justice, and sociotechnical critique. These literacies align with frameworks such as the EU's Digital Citizenship Education model [10] and respond directly to learners' experiences in platform-mediated environments.

To actualize postdigital citizenship's transformative potential, educational institutions must foster students' capacity to see themselves as co-constructors of their civic (digital and analog) environments. As Megan emphasized, students should be supported in “interrogating the underlying assumptions associated with digital technologies,” while Yoshi stressed the importance of enabling learners to reconfigure, not just adapt, to the digital systems shaping their lives.

4.3.2. School for/of life & lifelong learning

Preparing just, ethical, and agentic digital citizens is less about transmitting a “fixed set of individual skills” and more about cultivating a “lived, ongoing practice of becoming” within hybrid sociotechnical environments (Megan). Respondents highlighted several pedagogical implications of this shift.

Educators should create classroom conditions that allow learners to practice ethical judgment in context. Ethical reasoning enters a young person's everyday digital choices; thus educators must cultivate spaces where students reflect on their evolving identities and enact ethical action across the *school for/of life* continuum. Michelle emphasized that citizenship “is a relational process lived across physical-digital spaces rather than a theoretical concept.” She further noted that social media education can “foster awareness of the consequences of online actions and encourage respectful, safe, and responsible behavior.” Megan described ethical citizenship as comprising overlapping dimensions of being, doing, and knowing, which “cannot be disentangled [as] ethical digital citizenship is simultaneously about identity, action, and critical awareness.” These orientations align with the idea of communities of practice, where educators and learners jointly explore what digital citizenship means in their contexts.

Relational practice also includes nurturing dialogic capacity, particularly within polarized online spheres (*tech paradox* code). Toshinori emphasized the need for learners to possess the “robustness of intellect to not abandon dialogue,” even amid conflict. He argued that students need systems thinking and practical knowledge to make small, constructive interventions in contested civic spaces. Finally, digital citizenship education must adopt a *lifelong learning* perspective. Equitable civic participation extends beyond youth-focused initiatives and requires intergenerational support, including programs that help older adults engage meaningfully in digital society.

4.3.3. Inequity of access

The deepening integration of digital technologies simultaneously expands opportunities and risks, often exacerbating inequities. Michelle emphasized that *equity* must be made the foundational principle of digital engagement, arguing that sustained institutional efforts were required to provide inclusive access to digital resources and tools, ensuring that participation is not “constrained by socioeconomic status, geography, or other systemic barriers.”

Institutionally, achieving equity requires investment in human infrastructure as much as technical infrastructure. Yoshi and Michelle stressed the importance of transforming reactive, crisis-driven innovations (such as those emerging during COVID-19) into “long-term, equity-minded professional infrastructures” supported by workload reform and sustained capacity-building.

Table 6

Incidence of codes within the Ways forward lens.

Code	Way forward
Agency	×
Broad participation	×
Bronfenbrenner's ecosystem (context)	✓
Curriculum definition	✓
(In)equity	✓
Lifelong learning	✓
Policy involvement	✓
Professional development	×
School for/of life	✓
Sustainability	×
Tech paradox	✓

A critical dimension of structural inequity involved linguistic and cultural barriers. As Yoshi and Megan noted, English dominance online marginalizes minority-language speakers and reinforces unequal participation. Preparing digital citizens must therefore include cultivating intercultural competence and critical use of translation and accessibility technologies, leveraging them to widen participation while recognizing their limitations and biases.

4.3.4. Wider educational policy development

Respondents commented on the wider “meso and macro” interconnectedness and interplay of contextual factors that influenced all aspects of postdigital citizenship (*Bronfenbrenner’s ecosystem code*), suggesting an integrated approach. Michelle argued that effective digital citizenship education “requires attention to all ecological levels—macro, meso, and micro—so that educational practices remain both meaningful and context-sensitive.” This ecological integration fosters ethical reflection, critical awareness, and civic participation responsive to the challenges of an interconnected world.

For Yoshi, Japanese educational policy must address interconnected civic spheres, including language and cultural barriers that shaped access to services and civic participation. Yoshi outlined a comprehensive approach that includes “coupling universal infrastructure with equity strategies; extending safety-first traditions into rights- and participation-oriented ethics; empowering learner agency; lowering language barriers; valuing analog practices; and sustaining professional networks.” Megan articulated a future in which schools were “not isolated sites where digital citizenship is defined and enacted; they operate as connecting nodes across local and translocal networks in which students develop civic identities and practices.”

Yoshi illustrated the transformative potential of this approach through student-led initiatives such as campaigns, community mapping, and open educational resource projects that align classroom aims with the participatory affordances of digital ecosystems. Eamon described a similar vision: “postdigital citizenship education involves not only naming harms or prescribing literacies but enabling learners and teachers to act as co-creators of sociotechnical futures, questioning imaginaries, exercising rights, and experimenting with more just and sustainable ways of inhabiting digital ecosystems.”

Together, these perspectives point to a policy imperative centered on active participation, collaboration, and inclusivity, offering a clear way forward for policymakers seeking to support postdigital citizenship in education.

5. Discussion: cross-reflection and embracing difference

This discussion synthesizes the tensions, opportunities, and ways forward identified across the polylogue, examining our central research question, *How does considering postdigital ecosystems invite us to reimagine citizenship through education?*

In keeping with the polylogue methodology, the aim here was not to resolve contradictions or impose a unified framework, but to embrace plurality and generative disagreement.

The discussion is structured around three lenses that illuminated our findings:

- (1) Tensions as indicators of structural and relational conditions,
- (2) Opportunities emerging within hybrid spaces of reimagined action, and
- (3) Ways forward that reorient citizenship education as co-constructed, contextual, and ecosystemic.

5.1. Overlapping tensions and their generative potential

Across the polylogue, respondents described tensions not as problems to be eliminated but as signals of structural conditions that shape

how citizenship is enacted. Within these conditions, agency emerged as a central yet contested dimension, as learners were often positioned to adapt to, rather than actively shape, the digital systems that structure their participation. The cross-reflection of tensions, opportunities, and ways forward demonstrates how each analytic category intersects with the others, forming a dynamic matrix of educational possibilities. This intersection allows tensions to become fertile grounds for reflection and action. For example, policy-practice misalignments constrain teacher capacity while at the same time opening avenues to question assumptions, revisit priorities, and build more inclusive approaches [47]. Similarly, inequities surfaced both as obstacles and as catalysts for designing more just educational interventions. This orientation reflects the core premise of postdigital thinking: that digital life is not a separate sphere but deeply entangled with the material, social, ecological, and political systems that shape lived experience. Such entanglement requires educators to approach tensions not as contradictions to be resolved, but as conditions to be navigated and inhabited.

5.2. Opportunities within hybrid and entangled learning spaces

Respondents repeatedly emphasized that opportunities for citizenship education emerged most strongly within the complexities of postdigital life rather than apart from them. Youths’ everyday digital practices, institutional contradictions, cultural norms, and environmental concerns all provide openings for ethical, participatory, and critically informed engagement. The polylogue revealed that hybrid online-offline learning environments, when intentionally recognized, allowed students to explore identity, visibility, and belonging. These hybrid spaces enabled them to experiment with active, reflective, and socially just forms of postdigital citizenship, developing competencies that transferred across different digital and material ecosystems.

Moreover, opportunities surfaced when educators encouraged agency in students as knowledge producers rather than passive recipients, an insight consistent across contexts. Megan’s analysis of youth practices, Yoshi’s insights on hybrid Japanese environments, Michelle’s focus on dispositions, and Eamon’s critique of school-platform divides all pointed toward a relational, dialogic approach to civic learning.

The cross-reflection also highlighted the significance of culturally sustaining pedagogies, linguistic diversity, and ecological responsibility. These dimensions intersected with opportunities: valuing analogue practices alongside digital ones, recognizing platform-native civic expressions (memes, short-form videos, collaborative storytelling), and empowering learners to author civic narratives that reflect their lived realities. Collectively, these opportunities underscored that postdigital citizenship education was not merely an instructional goal but a situated practice of ethical cohabitation, made visible when educators, learners, and communities embrace complexity as a site of possibility.

5.3. Ways forward: reorienting citizenship as relational, critical, and ecosystemic

The collective insights highlight that subtle, yet critical, shifts are required across all aspects of curriculum design, pedagogical execution, and institutional commitment. These shifts demand an enduring focus on equity while remaining cognisant of the wider contextual factors at play in local educational policy. Future praxis cannot sit in isolation; rather, it must be understood as an integrated interplay of the myriad factors that constitute postdigital citizenship. This aligns with postdigital citizenship’s emphasis on co-creation and collaborative problem-solving, recognising that meaningful civic participation emerges through relational and contextually embedded practices.

Ecopedagogies emerging from postdigital perspectives further illuminate these pathways forward. We hereby redefine educational practices that are actively open to civic co-creative relationships and the local contexts that nurture them as “ecopedagogy”. Such approaches promote dialogue, critical reflection, and relational ethics, valuing

teacher sensemaking, emotional labor, and cultural positioning [32,48]. They extend traditional critical pedagogy (e.g., [49]) by foregrounding ecological consciousness and examining how digital technologies are deeply entangled with ecological and social systems [26]. Rather than teaching about the environment in isolation, postdigital ecopedagogies ask how learners and educators can live, learn, and act responsibly in a world where digital and ecological realities are inseparable. This perspective also calls for resisting the acceleration of AI-driven educational models in favor of slower, more caring, community-based practices that reaffirm education as a human-centered, ethical, and situated endeavor [24].

Postdigital citizenship thus moves beyond the notion of simply using digital tools or being present online. It emphasizes critical awareness of how technology shapes identity and participation in social, political, cultural, and civic life [26,29]. It requires ethical and responsible action across both digital and physical spaces, acknowledging the blurred boundaries that characterise contemporary civic experience [22].

Postdigital educational ecosystems must find ways to foster learners' agency, critical engagement, and ethical cohabitation across hybrid environments through contextualized scenarios. These ecosystems must also address persistent inequalities of access and use. Acting within such local and relational contexts allows learners to experiment with active, reflective, and socially just forms of postdigital citizenship, developing competencies that can be transferred across digital, material, and hybrid ecosystems.

6. Conclusion

The collaborative discourse that shaped this paper led the authors to recognize that postdigital ecosystems are complex and require examination from multiple perspectives in the development of digital citizenship education. Throughout the polylogue, tensions uncovered through the analysis of responses were not treated as problems to be resolved but as invitations to examine the structural and systemic forces shaping digital citizenship. Tensions emerged through policy-practice disconnects, narrow curricula, persistent inequities in access and participation, and the contradictory role of digital technologies in educational ecosystems. These tensions created opportunities to reimagine ways forward that could support more just and agentic participatory practices across educational ecosystems. Opportunities appeared in hybrid and entangled learning spaces, students' everyday digital practices, and more relational and dialogic approaches to civic learning.

In answering the question about how postdigital ecosystems invite us to reimagine citizenship through education, the findings outline ways forward such as curricular transformation, lifelong and relational learning, equity-centered design and access, ecopedagogical orientations, and policy development that reflects ecological complexity. Educators and policymakers should adopt a postdigital approach to education by designing digital and non-digital learning environments that foster learner agency and active participation, while thoughtfully addressing the increasingly fluid boundaries between human activity and technology systems.

Sustaining ethical, equitable, and empowered citizens in a postdigital ecosystem requires a thoughtful shift in educational philosophy that moves beyond technical compliance to embrace systemic awareness, relational approaches, and collaborative meaning-making. Central to this reorientation is a reconceptualization of agency, which emerges as both essential and contested, as learners have too often been positioned to adapt to, rather than actively shape, the digital systems that structure their participation.

To realize the potential of postdigital citizenship, educational institutions must therefore cultivate students' capacity to understand themselves as co-constructors of their community and civic environments across both digital and analog contexts, while also embracing digital citizenship education as a lifelong learning endeavor. This

includes fostering intercultural competence and leveraging these tools to expand participation while remaining attentive to their limitations and embedded biases. Together, these perspectives point to essential policy directions centered on active participation, collaboration, and inclusivity, offering a clear path forward for advancing postdigital citizenship in education.

The polylogue further revealed that postdigital citizenship education resists a universal definition. As Toshinori argued, it "is given a distinct interpretation that reflects the dominant values and norms of the locality," a locality-dependence that mirrors the globally inequitable nature of postdigital ecosystems themselves. Yet this is not meant to encourage relativism: postdigital citizenship education can equally be positioned as "a constant attempt to seek the possibility of dialogue in a society where disparate values coexist." Together, these observations offer a direct response to the overarching research question: considering postdigital ecosystems invites us to reimagine citizenship through education as a locally inflected yet dialogically oriented practice, continuously negotiated across the boundaries of postdigital life.

6.1. Summary of contributions and implications

This study contributes to the field in several key ways. First, it advances a postdigital conceptualization of digital citizenship that foregrounds relationality, sociotechnical entanglement, and context-dependence over fixed individual competencies. Secondly, our findings suggest several implications for policymakers, educators and researchers. A postdigital viewpoint of citizenship shifts from a narrow skill-based model to ecosystematic approaches that acknowledge how policy, infrastructure, cultural norms, and platforms co-shape civic participation. Policies should support equitable access to learning environments, ensure transparency and accountability in data and AI systems, and foster participatory cultures in schools and communities to enact citizenship as an agentic practice. Critical data literacy, socio-technical awareness, and ethical engagement should be part of learning experiences to help learners navigate the complexities of citizenship. Educators can use dialogic and co-constructed practices to mirror civic practices of deliberation, critical thinking, collaborative problem solving, and understanding across differences.

Finally, we also demonstrate how a polylogue methodology offers a productive framework for examining complex topics such as educational ecosystems while modeling the concepts of dialog, reflection and shared realities of postdigital experiences in different cultures, experiences and environments. The polylogue functioned not only as a methodological approach but also a framework to enact the citizenship practices it sought to study: dialogue, negotiation, mutual recognition and ethical engagement across cultural and technological boundaries.

6.2. Limitations

This polylogue endeavour presents several limitations. Although the EDUsummIT working group represented different geographic and institutional contexts, all contributors work within education and related academic disciplines, which may shape their perspectives and limit the range of lived experiences represented in the discussion. Moreover, the (voluntary) respondents voiced perspectives from three countries only, namely Canada, Japan and Ireland, with a clear underrepresentation of other countries' experiences in this post digital landscape. We acknowledge that, throughout the polylogue, we sought to address a wider range of environments in order to account for a multiplicity of points of view. Finally, in the data analysis, while recursive coding and measures to ensure trustworthiness were applied, we recognize that some errors may have occurred when applying codes or attributing them to one specific lens or viewpoint, over another. This may have influenced the overall insights portrayed by the current manuscript.

6.3. Future perspectives

Future research may explore both the polylogue methodology and also the conceptual contributions on citizenship of this work. Polylogue methodology offers a promising approach for examining complex issues with multiple perspectives, and future studies might employ it in other areas to support critical reflexivity and collaboration. The enactment of postdigital citizenship within varied ecosystems requires further study to understand how infrastructures, algorithms (including artificial intelligence), cultural norms, and geopolitical conditions shape opportunities for agency, participation, and justice. These directions invite continued interdisciplinary work that advances the understanding of the lived realities of postdigital citizenship within educational ecosystems.

Acknowledgements

The authors would like to acknowledge the members of thematic working group 9 (TWG9) whose early discussions, shared reflections, and collaborative commitments helped establish the foundations of this work. All TWG9 members in some shape or form meaningfully informed the development of the polylogue and informed the ideas presented here through their insights and perspectives meaningfully shaped. We extend our sincere thanks to: Ottavia Trevisan (University of Padova), Elizabeth Langran (Marymount University), Alison Egan (Marino Institute of Education), Eamon Costello (Dublin City University), Florence Michaux-Colin (University of Paris City, EDA Lab.), Jayakrishnan Madathil Warriem (IIT Madras), Louise Starkey (University of Tasmania), Megan Cotnam-Kappel (University of Ottawa), Michelle Deschênes (Université du Québec à Rimouski), Pekka Mertala (University of Jyväskylä), Rhonda Christensen (University of North Texas), Séverine Parent (Université du Québec à Rimouski), Stefania Bocconi (Institute for Educational Technology, National Research Council of Italy), Toshinori Saito (Seisa University), Tracy Hogan (Dublin City University), and Yoshiko Goda (Kumamoto University). Their contributions to the broader TWG9 dialogue were instrumental in shaping the intellectual groundwork of this collective endeavor.

Funding sources

This research received no specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

During the preparation of this work the authors used ChatGPT and Gemini, in order to translate portions of text into English; copyedit and refine the academic tone; to structure initial ideas into prose; for the initial identification of possibly relevant academic literature to support arguments; to improve the readability, conciseness, and clarity of the English text. After using these tools/services, the authors reviewed and edited the content as needed, ensuring that the English word choices most accurately reflect their original vocabulary and intent. All the authors take full responsibility for the content of the published article.

CRedit authorship contribution statement

Ottavia Trevisan: Writing – review & editing, Writing – original draft. **Elizabeth Langran:** Writing – review & editing, Writing – original draft. **Rhonda Christensen:** Writing – review & editing, Writing – original draft. **Séverine Parent:** Writing – review & editing, Writing – original draft. **Yoshiko Goda:** Writing – review & editing, Writing – original draft. **Florence Michaux-Colin:** Writing – review & editing, Writing – original draft. **Megan Cotnam-Kappel:** Writing – review & editing, Writing – original draft. **Michelle Deschênes:** Writing – review & editing, Writing – original draft. **Alison Egan:** Writing – review &

editing, Writing – original draft. **Eamon Costello:** Writing – review & editing, Writing – original draft. **Toshinori Saito:** Writing – review & editing, Writing – original draft.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this manuscript.

References

- [1] Fawns T. Postdigital Education in design and Practice. *Postdigital Sci Educ* 2019;1(1):132–45. <https://doi.org/10.1007/s42438-018-0021-8>.
- [2] Emejulu A, McGregor C. Towards a radical digital citizenship in digital education. *Crit Stud Educ* 2019;60(1):131–47. <https://doi.org/10.1080/17508487.2016.1234494>.
- [3] Rapanta C. Postdigital citizenship education. In: Jandrić P, editor. *Encyclopedia of postdigital science and education*. Cham: Springer; 2023. https://doi.org/10.1007/978-3-031-35469-4_40-1.
- [4] Phillips M, Fisser P, Leahy M, Butler D, editors. *EDUsumMIT 2025 – designing education ecosystems for the future: the role of digital technologies*. Ireland: EDUsumMIT2025; 2025. Retrieved December 19, 2025 from, <https://www.learntechlib.org/p/2128761/>.
- [5] Huschle L, Kindlinger M, Abs HJ. Personal responsibility and beyond: developing a comprehensive conceptualization of digital citizenship competences. *Weizenbaum J Digit Soc* 2024;4(4):1–25. <https://doi.org/10.34669/WLWJDS/4.4.5>.
- [6] Ribble M, Bailey G. *Digital citizenship in schools*. ISTE; 2007.
- [7] Veugelers W. Creating critical-democratic citizenship education: empowering humanity and democracy in Dutch education. *Comp J Comp Int Educ* 2007;37(1): 105–19. <https://doi.org/10.1080/03057920601061893>.
- [8] International Society for Technology in Education. (n.d.). *ISTE standards for students*. ISTE. <https://iste.org/standards/students>.
- [9] Ozturk G. Digital citizenship and its teaching: a literature review. *J Educ Technol Online Learn* 2021;4(1):31–45. <http://dergipark.org.tr/jetol>.
- [10] Richardson J, Milovidov E. *Digital citizenship education handbook*. Council of Europe Publishing; 202202022 ed. book.coe.int.
- [11] UNESCO. A global framework of reference on digital literacy skills for indicator 4.4.2. 2018. <https://uis.unesco.org/sites/default/files/documents/ip51-global-framework-reference-digital-literacy-skills-2018-en.pdf>.
- [12] UNICEF. *Digital literacy for children: exploring definitions and frameworks*. scoping paper no. 01. UNICEF Office of Global Insight and Policy; 2019. <https://www.unicef.org/globalinsight/media/1271/file/UNICEF-Global-Insight-digital-literacy-scoping-paper-2020.pdf>.
- [13] Westheimer J, Kahne J. What kind of citizen? *The politics of educating for democracy*. *Am Educ Res J* 2004;41(2):237–69. <https://doi.org/10.3102/00028312041002237>.
- [14] Fernández-Prados JS, Lozano-Díaz A, Ainz-Galende A. Measuring digital citizenship: a comparative analysis. *Informatics* 2021;8(1):18. <https://doi.org/10.3390/informatics8010018>.
- [15] Pangrazio L, Sefton-Green J. Digital rights, digital citizenship and digital literacy: what's the difference? *J New Approaches Educ Res* 2021;10(1):15–27. <https://doi.org/10.7821/naer.2021.1.616>.
- [16] Kahne J, Bowyer B. Educating for democracy in a partisan age: confronting the challenges of motivated reasoning and misinformation. *Am Educ Res J* 2017;54(1): 3–34.
- [17] Gazi ZA. Internalization of digital citizenship for the future of all levels of education. *Educ Sci/Egit Ve Bilim* 2016;41(186). <https://doi.org/10.15390/EB.2016.4533>.
- [18] LeBlanc M, Léger MT, Freiman V. La citoyenneté numérique dans un monde interconnecté: recenser et modéliser pour mieux éduquer. *Éduc Francoph* 2021;49(2):1–15. <https://doi.org/10.7202/1085299ar>.
- [19] Jandrić P, Knox J, Besley T, Ryberg T, Suoranta J, Hayes S. Postdigital science and education. *Educ Philos Theory* 2018;50(10):893–9. <https://doi.org/10.1080/00131857.2018.1454000>.
- [20] Taffel S. Perspectives on the postdigital: beyond rhetorics of progress and novelty. *Converg: Int J Res New Media Technol* 2016;22(3):324–38. <https://doi.org/10.1177/1354856514567827>.
- [21] Jandrić P, Knox J. The postdigital turn: philosophy, education, research. *Policy Futures Educ* 2022;20(7):780–95. <https://doi.org/10.1177/14782103211062713>.
- [22] Moylan R, Code J, O'Brien H. Teaching and AI in the postdigital age: learning from teachers' perspectives. *Teach Teach Educ* 2025;153:104851. <https://doi.org/10.1016/j.tate.2024.104851>.
- [23] Fawns T, Ross J, Carbonel H, Noteboom J, Finnegan-Dehn S, Raver M. Mapping and tracing the postdigital: approaches and parameters of postdigital research. *Postdigital Sci Educ* 2023;5(3):623–42. <https://doi.org/10.1007/s42438-023-00391-y>.
- [24] Raffaghelli JE, Ferrarelli M, Rodríguez NL. Slowness as postdigital positionality in the era of generative AI: a conversation. *Postdigital Sci Educ* 2025;7:1224–49. <https://doi.org/10.1007/s42438-025-00554-z>.
- [25] Doueiri M. *Digital cultures*. Harvard University Press; 2011.

- [26] Jandrić P, Ford DR. Postdigital ecopedagogies: genealogies, contradictions, and possible futures. *Postdigital Sci Educ* 2022;4(3):692–710. <https://doi.org/10.1007/s42438-020-00207-3>.
- [27] Merzeau L. Le profil: un nouveau territoire imaginaire ? Conférence de Louise Merzeau transcrite par Camille Alloing et Mariannig Le Béchec. *Quest Commun* 2018;34(2):41–54. <https://doi.org/10.4000/questionsdecommunication.15434>.
- [28] Krivý M. Digital ecosystem: the journey of a metaphor. *Digit Geogr Soc* 2023;5: 100057. <https://doi.org/10.1016/j.diggeo.2023.100057>.
- [29] Örtengren A. Philosophical underpinnings of digital citizenship through a postdigital lens: implications for teacher educators' professional digital competence. *Educ Inf Technol* 2024;29(4):4253–85. <https://doi.org/10.1007/s10639-023-11965-5>.
- [30] Örtengren A, Olofsson AD. Pathways to professional digital competence to teach for digital citizenship: social science teacher education in flux. *Teach Teach* 2024;30 (4):526–44. <https://doi.org/10.1080/13540602.2024.2342860>.
- [31] Soriani A. From Media education to Digital citizenship. Origins, perspectives and policy implementations in the school systems across Europe. *Ric Pedagog Didatt* 2018;13(3):85–122. <https://doi.org/10.6092/issn.1970-2221/8557>.
- [32] Raffaghelli JE. (Post)Digital scholarship. *professionalità accademica e trasformazione digitale in università*. *Pensa multimedia*; 2024.
- [33] Farrow R, Iniesto F, Weller M, Pitt R. Research methods handbook. 2020. <https://open.library.okstate.edu/gognresearchmethods/>.
- [34] Markauskaite L, Marrone R, Poquet O, Knight S, Martinez-Maldonado R, Howard S, Tondeur J, De Laat M, Buckingham Shum S, Gašević D, Siemens G. Rethinking the entwinement between artificial intelligence and human learning: what capabilities do learners need for a world with AI? *Comput Educ: Artif Intell* 2022;3:100056. <https://doi.org/10.1016/j.caeai.2022.100056>.
- [35] Prestridge S, Tan SC, Jacobsen M, Hoppe HU, Angeli C, Milrad M, Khaddage F. Disconnected connections of learning beyond formal schooling through human–computer–human interactions. *Technol Knowl Learn* 2024;29(4): 1791–807. <https://doi.org/10.1007/s10758-024-09779-6>.
- [36] Egbai UO, Chimakonam JO. Why conversational thinking could be an alternative method for intercultural philosophy. *J Intercult Stud* 2019;40(2):172–89. <https://doi.org/10.1080/07256868.2019.1577811>.
- [37] Guimont Marceau S, Drouin-Gagné M-E, López Urrego Á. Des relations comme support de méthodes de recherche participatives: polylogue, cartographie et décolonisation. *Sociol Soc* 2022;54(2):101–23. <https://doi.org/10.7202/1113063ar>.
- [38] Braun V, Clarke V. One size fits all? What counts as quality practice in (reflexive) thematic analysis? *Qual Res Psychol* 2021;18(3):328–52. <https://doi.org/10.1080/14780887.2020.1769238>.
- [39] Dempsey C. Ethical considerations in educational technology ecosystems. *Int J Educ Technol Ethics* 2021;2(1):10–23.
- [40] Korstjens I, Moser A. Series: practical guidance to qualitative research. Part 4: trustworthiness and publishing. *Eur J Gen Pract* 2018;24(1):120–4. <https://doi.org/10.1080/13814788.2017.1375092>.
- [41] OECD. *Students, computers and learning: Making the connection*. pisa. OECD Publishing; 2015. <https://doi.org/10.1787/9789264239555-en>.
- [42] Reed J. Postdigital nature connection. *Postdigital Sci Educ* 2025;7(2):316–26. <https://doi.org/10.1007/s42438-024-00528-7>.
- [43] Cotnam-Kappel M, Woods H. Online participation in French Ontario: avenues for reflection and action to redefine Francophonie with and for young people. *Éduc Francoph* 2020;48(1):144–63. <https://doi.org/10.7202/1070104ar>.
- [44] McCoy S, Marcus-Quinn A. Navigating youth, smartphones, and policy: a balanced perspective on digital wellbeing. *Pediatr Res* 2025;98:1985–7. <https://doi.org/10.1038/s41390-025-04288-3>.
- [45] Putnam RD, Leonardi R, Nanetti RY. *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton University Press; 1994.
- [46] Oide (2025). What is digital citizenship and how to teach it (Post-Primary). Retrieved September 30, 2025, from <https://www.oidechnologyineducation.ie/onlinecourses/what-is-digital-citizenship-and-how-to-teach-it/>.
- [47] Bo NSW. OECD digital education outlook 2023: towards an effective education ecosystem. *Hung Educ Res J* 2025;15(2):284–9. <https://doi.org/10.1556/063.2024.00340>.
- [48] Arnold N, Ducate L. Visual methods as a window into teacher cognition and technology integration. *Second Lang Res* 2024;5(1):66–88. <https://hdl.handle.net/10125/69888>.
- [49] Freire P. *Pedagogy of the oppressed*. Penguin Books; 1996.