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Nationhood in/through digital education: proposition for an analytical framework

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ABSTRACT

This paper develops a research framework to explore the relationship between nationhood, education, and digital transformation, focusing on nationhood's manifestation and (re)construction in/through digitalising education. We examine two parallel dimensions of digital technologies, the material and symbolic aspects, combining this focus with a social constructionist perspective on nationalism to relate the discourses and affordances of digital technologies to nationhood across three key dimensions of space, time, and people. By revisiting the examples of recent social and education research, we demonstrate the relevance of this integrated analytical framework to research on how education, digital transformation, and nationhood interact to shape contemporary societies. Finally, we propose some potential avenues for future research based on this framework.

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Introduction

The ongoing digital transformation has become a defining feature of contemporary societies and education, at least in wealthier countries (Selwyn 2021), bringing not only technological innovation but also complex societal and educational changes. This has become a significant focus of academic inquiry as scholars strive to understand and respond to this evolving digital landscape.

Echoing Tröhler's (2020) observation about the frequent underestimation of nationalism in education and curriculum research, a similar oversight can be found in digital education studies. There is a tendency to examine digital education as a phenomenal rupture and replacement (Piattoeva 2023), neglecting continuities with education's historical nation-building roles. Meanwhile, studies of nationhood in education contexts continue to focus on non-digital environments such as national curricula (Giudici 2024; Hofmann 2016; Tang, Chong, and Yuen 2019) or textbooks (Hao and Cherng 2020). While foregrounding the roles of objects in and outside the campus, such as teaching materials, the national flag, or the national anthem (Hammond 2016), studies pay much less attention to digital transformation's discourses and tools.

We believe updates are necessary if we are to understand the complex link between education, nationhood, and digital transformation. Digital education serves and is promoted through nationalist discourses, making digital technologies seem inevitable and more difficult to critique; digital technology supplies the material foundation and the ideological underpinning to consolidate and (re)shape the power of education in performing and promoting nationhood. Further inquiries are necessary to understand how digital transformation concurrently sustains and questions

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education's historical links with nation building. Such studies are vital to illuminate digital education's dual roles – its capacity to reinforce existing national ideologies, while challenging or creating alternative national narratives.

The article's primary purpose is to develop a research framework to systematically explore how the nation is sustained and (re)constructed in/through various education settings undergoing digital transformation. The next section provides a general theoretical discussion and presents our proposed theoretical framework. The three sections that follow review relevant studies to demonstrate how the proposed framework can be connected to current academic discussions of digital nationalism and digital education, offering new interpretations of existing studies and proposing possibilities for future research. Finally, the discussion section summarises the article's main points and offers concluding remarks.

Theoretical discussion

Digital nationalism and nationhood

In our research framework, we consider both dimensions of nationalism: (1) ideology versus practice; and (2) elite versus quotidian (Bonikowski 2016).

First, we approach nationalism as ideology, mindset, political principle, and discourse, but also as practice. As an ideology, nationalism produces a cultural understanding and rhetoric that leads people to think of and frame their aspirations in terms of the idea of the nation and national identity (Calhoun 1997), both internally and externally. Nationalism internally constructs a sense of nationhood that shapes the state–citizen relationship and constitutes the nation as a unique social bond of cohesion and solidarity among its members (Carrier 2018). Externally, nationalism builds a mindset of the world as one of nations, divided according to a nation-based principle (Elgenius 2011). Nationalism is thus manifested as both a category of practice and one of the underlying – yet malleable – cognitive and ideological frames shaping how people see and behave in their daily lives (Antonsich 2020; Malešević 2019; Özkırımlı 2017). Nationhood thus does not exist outside politics, social relations, histories, and the various discursive and material practices that (re-)embed the nation. The task of sociological analysis is to explore how nationhood is reproduced and how nationalism institutionalises the nation as a political and cultural category of practice (cf. Brubaker 1996). The same holds true for the sociology of education research.

Second, we investigate how nationalism and nationhood are manifested both strategically in state politics (elite nationalism) and mundanely in vernacular life (quotidian nationalism) (Antonsich 2020; Billig 1995; Bonikowski 2016). The concept of 'nation' is broader than 'state' or 'regime', and 'digital nationhood' is therefore broader than 'digital statehood'. As Montresor (2001) explains, techno-statism mainly concerns the formal institutional components of the state and state authority as a policymaker in science and technology. Meanwhile, techno-nationality requires a consideration of socioeconomic commonalities, their social, historical, cultural, and ethnographic foundations, as well as the sociohistorical shaping of innovation and technologies (Montresor 2001). Drawing on Montresor's differentiation, we recognise that while discussing digital nationalism inevitably requires a consideration of the impacts of digital transformation on the state and vice versa (see e.g., Tammpuu and Masso 2018), digital nationhood cannot be conflated with digital statehood. Investigating nationhood in the digital era requires the inclusion of various emerging actors gaining a greater voice as ethnopolitical entrepreneurs and new mediators of the nation (Mihelj 2023; Mihelj and Jiménez-Martínez 2021). This also extends to the notion of digital capitalism, where global capitalism is geographically differentiated and localised to form new markets through adaptation to and reproduction of the languages, currencies, or library categories customised for each country (Lobato 2019), disguising digital capitalism's transnational origins through national symbols and practices (Huijsmans and Lan 2015).

Applying the above perceptions to the study of nationhood and nationalism in the digital era, we conceptualise digital nationalism, following Ahmad (2022, 310), as 'encompassing all forms of everyday, user-generated, and elite-driven nationalism which use the Internet and social media to create, sustain and project specific ideas of the nation and/or intend to mobilize support for a specific vision of nationhood'.

Three dimensions of nationhood

Inspired by Özkırımlı's (2017) social constructionist approach to nationalism, our framework incorporates space, time, and identity (relabelled as people) as key dimensions of (digital) nationhood.

The spatial dimension concerns the processes of territorial imagination through which social spaces are (re)constructed as national spheres. The spatial dimension answers the question, 'Where is our nation and our nationals?' It encompasses declarations concerning national borders or natural and physical environments, emphasising the nation's deeply rooted presence within specific landscapes and territories. While Özkırımlı focuses on relatively 'fixed' physical and territorial spaces, we believe the spatial dimension requires a more flexible interpretation to address national spaces in the digital realm. This dimension can be analysed both externally and internally. Externally, it concerns how a nation defines its positions and borders in relation to the outer world. Internally, the spatial dimension navigates our attention to the zones where a sense of nationhood is cultivated among a nation's members and nationals' embeddedness in their national spheres.

The temporal dimension involves assertions about a nation's unique historical narrative and continuous timeline, spanning its past and future. While Özkırımlı focuses primarily on the historical aspect (past–present–future), our interpretation also observes the speed and tempo that construct the nation through synchronicity.

In addressing 'Who are we as a nation and nationals?', Özkırımlı's (2017) third dimension of identity includes claims about the values determining inclusion/exclusion and membership of the nation, distinguishing 'us' from 'them'. The nationalist claims in this dimension foster a sense of a homogeneous national community, promoting affection, bonds, and loyalty to the nation. Our proposed framework extends this dimension by exploring it externally (examining the nation's self-image in the world) and internally (referencing national values, national population management, and the sense of belonging, connection, and participation in national communities). Given this expanded scope, especially the shift towards people's connectivity in forming the national community, we relabel this dimension 'people' and use this label in the rest of the paper.

The material and symbolic aspects of digital technologies

Technology is neither a neutral conduit nor a transmitter of social communication and national expressions, but an agent that co-shapes content and mediates and materialises further transformations. These, in turn, influence social reality and (re)shape social subjects and national imagination (Larkin 2008; Mihelj 2023; Möllers 2021; Musiani 2022).

Our framework builds on two aspects through which digital technologies relationally interact with society: material and symbolic. First, as technical objects (Larkin 2008), technologies shape social realities through material aspects – their inherently tangible, sensory, and technical qualities. This materiality encompasses performance, technical affordances, and the functioning of technologies and the networks built between various infrastructures (Larkin 2008, 2013). The material aspect is crucial for creating technical and institutional arrangements, shaping how infrastructures operate and how they can construct, border, and negotiate regional, national, and transnational flows of people, goods, power, and ideas (Larkin 2013). In doing so, they connect people to communities and form the architecture of society, nationhood, and citizenship (Larkin 2008; Möllers 2021).

Second, as conceptual objects (Larkin 2008), technologies can create and convey meaning via symbolic logic. Regarding this aspect, Larkin (2008) calls for a focus on ideologies (including nationalist ones), affects, ambitions, and promises embedded in and communicated by technologies. As he discusses in his 2013 publication, technology infrastructures 'emerge out of and store within them forms of desire and fantasy' that in various cases 'can be wholly autonomous from their technical function' (Larkin 2013, 329). This symbolic aspect resembles Möllers's (2021) 'moral dimension', which implies the entwined normative ideas of technologies. Exploring the symbolic aspect prompts us to consider how technological infrastructure development can function as a representational act to justify state or other actors' authority and normalise social inclusion (or exclusion) (Larkin 2008; Möllers 2021). This dimension, therefore, encourages a closer examination of the relationship between infrastructural technologies and modes of governance (Larkin 2008). It is expressed not only through discourses but various practices of aesthetic exhibiting to highlight technological achievements (Larkin 2008). The state (and other actors) may use them as symbols of modernisation, advancement, vitality, or other fantasies of the nation (Piattoeva 2023), making them a component of patriotism and nationhood. The material and symbolic aspects coexist and, to some extent, rely on each other. As Larkin (2013) explains, these infrastructures function at multiple levels, performing technical tasks while acting as representational forms to shape social realities.

Combining Özkırımlı's (2017) three dimensions of nationhood with analyses of the material and symbolic aspects of digital technologies, we elaborate a research framework on nationhood as it is manifested in and through digital(ising) education. The proposed research framework is summarised in the table in the appendix. The subsequent sections are structured around the three dimensions of nationhood – space, time, and people. Within each we integrate both material and symbolic aspects to explore the complex interplay between nationhood, digital technologies, and education. We highlight how the framework enables novel interpretations of and connections between existing studies, opening new and timely research avenues.

Digital transformation and the national space

National territory and borders in relation to the outer world

Digital transformation has drastically reshaped the perspectives of nationhood, national sovereignty, and national borders. On the one hand, global connectivity through vast and intricate online networks means national sovereignty is no longer confined to geographical territories (Ahmad 2022). The globally distributed nature of internet infrastructure and the rise of artificial intelligence have the potential to challenge states' autonomous decision-making power in national matters, making domestic political regimes more open and sometimes vulnerable to global corporations' interference (Gulson et al. 2021).

On the other hand, digital borders are intertwined with and mirror nation states' territorial borders (Mihelj 2023). Mihelj and Jiménez-Martínez (2021) discuss at least three primary mechanisms through which digital technologies reinforce the nation by recreating national borders in the digital realm. First, this is achieved by the internet's structuring into national domains (e.g.,.uk,.vn,.cn). Second, search engine algorithms and recommendation settings can reproduce national biases and particular imaginings of the nation within a web-bounded locality. Finally, the domain system, algorithms, and hyperlink system (usually more connected to pages from the same country or in the same language) co-create dense national digital ecosystems that (re)produce digital national borders (see also Schneider 2018). Such a digital ecosystem is becoming a component of national space and sovereignty over which most countries may wish to gain control (Musiani 2022). Thus, although digital technologies challenge traditional notions of national borders, they simultaneously enable new ways for states to gain authority and sovereignty over national digital landscapes.

The impact of digital transformation on national borders and state sovereignty is complex and contradictory, with both reinforcement and erosion co-occurring. Rather than seeking a definitive answer, it is more fruitful to recognise its paradoxical dynamic. Boichak and Kumar (2022) illustrate this with diasporic communities, where the 'national web' is both porous to transnational flows and nationally bounded by cultural cohesion. The extent to which states can assert digital sovereignty varies, influenced by factors such as integration with other national systems and dependence on global digital infrastructure. Russia and China exemplify efforts to build self-reliant digital ecosystems to secure sovereignty (Mihelj 2023; Mihelj and Jiménez-Martínez 2021).

The above analyses highlight digital technologies' material aspects in infrastructuring, breaching, reinforcing, and reconfiguring national spaces. Digital technologies are also embedded with symbolic aspects, through which national spaces and borders are (in)validated. Digital infrastructures may embody national ambitions or serve as contested arenas where countries compete to establish, secure, and promote their national cyberspace. In this context, the ideas of nationhood function both as a rhetorical device to underscore the urgency of digital infrastructure development and as a social construct (re)defined through the digital transformation process.

Examining the process of 'making digital territory' in Germany, Möllers (2021) shows that when adapting the globally distributed digital infrastructure to the bounded national territory, the German state has attempted to use language and imagery to nationalise these infrastructures by promoting normative ideas of nation, national identity, citizenship, national belongings, and patriotism. Studying the use of domain name extensions in Kazakhstan, Shklovski and Struthers (2010) also demonstrate that these domains both (re-)establish and challenge a sense of national boundaries, not only as technical markers or organisational tools but also as powerful symbolic representations of nationhood on the internet. Domain users associate the national domain with feelings of allegiance and belonging to the nation. Meanwhile, choosing generic top-level domains (e.g.,.com,.info) instead of national domains signifies a symbolic detachment from the nation. These associations may be rooted in the domain's symbolic meaning, operating independently of the website's physical location or technological feasibility.

Studies that focus directly on digital education's impact on national spatial perspectives or national cyberspace sovereignty are scarce in the realm of education. However, some have begun to note the complex spatial dynamics at play. Digital technologies enable a connection beyond national boundaries (Peters and Besley 2024) and blur the distinctions between global and local, private and public, formal and informal, and online and offline education environments (Greenhow, Lewin, and Bret Staudt Willet 2023; Wardak, Vallis, and Bryant 2022); yet online learning systems continue to replicate national boundaries and hierarchical power structures (Wardak, Vallis, and Bryant 2022).

van de Oudeweetering and Decuypere (2023) demonstrate this dynamic in their study of a digital European online education platform. Although the initiative was envisaged to create borderless education, the national mindset and linear notion of national borders prevail when national labels are used for various classroom practices, for example. Instead of a dichotomy between 'national' and 'transnational', however, digital education technologies enable flexible combinations and 'bouncing' between different spatial rationales. Digital education projects can bridge different 'levels' such as regional (EU), national, and local, ensuring each level remains relevant and meaningful rather than overriding the others. Participants can even create comfortable and intimate spaces (like private online sessions) to study and connect with those from other nations. Online education platforms, therefore, facilitate connections 'multinationally', allowing users to interact across national boundaries while fostering allegiance to national identities. The study resonates with our approach, highlighting the dynamic and fluid nature of space in digital education as intricate networks between entities, rather than viewing borders as fixed and rigid.

Building on this conceptualisation of space, future interdisciplinary research can move beyond the technical aspects of digital education to examine its symbolic dimensions, particularly how narratives of nationhood and national space are produced across various education platforms. Critical

inquiry into how global MOOC platforms (e.g., Coursera, Khan Academy, Udemy) may circulate or challenge dominant national narratives is required, especially when shaped by universalist or Western-centric epistemologies. This analysis should also consider state-sponsored platforms aimed at nationals abroad and the counternarratives diasporic or activist communities create (e.g., Boichak and Kumar 2022). Such an exploration may shed light on the contested nature of digital sovereignty and the evolving definitions of nationhood in digital education spaces.

Logging-in the national space

Thus far, we have discussed the spatial dimension's external perspective. To elaborate Özkırımlı's (2017) framework, we now investigate this dimension internally to explore the national spaces into which nationals are locked – or perhaps logged in. As digital spaces become more adaptive, how people access their national spaces multiplies, and this requires scholarly attention.

In digital transformation and digital education discourses in many countries – as well as in some recent studies – digital technologies are often expected to promote free movement, openness, and increased connectivity among presumed nationals, both inside and outside the country, within a nationally bounded space. This occurs both materially via the attributes of digital infrastructures – for example, hyperlinks (Boichak and Kumar 2022), technical functions, dashboard menu structures (Grimaldi and Ball 2021), or language settings and mobile service subscriptions (Huijsmans and Lan 2015) – and ideologically via the discourses of digital transformation initiatives (Dey et al. 2024; Lim 2018).

When digital technology advances allow wider accessibility, the practices and meanings associated with digital access to national spaces also shift. As Huijsmans and Lan (2015) demonstrate, when mobile companies offer young people from ethnic minority communities cheap messaging services in the standard national language, they inadvertently and informally complement formal education's role in promoting young people's mastery of the national language in the context of low school attendance. Mobile subscriptions also log minorities into the national cyberspace, exemplifying how digital capitalism interweaves market logic with nationalist elements.

In another study of online education platform interfaces, Grimaldi and Ball (2021) discuss how dashboards and platforms expand access and connectivity, allowing learners to participate in a virtual space of flatness. Symbolically, flatness narratives can also be seen in the various contexts of educational digital transformation – for example, in India, when the nation is reimagined as one in which education actors and citizens can interact with each other and the state through a few clicks. This produces the flattening nation as a seemingly equitable space where geographical distance is no longer an issue, and everyone is equidistant from a national portal (Dey et al. 2024). Beyond discourse, such re-spatialisation of the nation depends on the availability of and uniform access to infrastructures, financial resources, the requisite devices, and citizens' skills and ability in using these services (Dey et al. 2024).

Alongside our earlier analysis of external spatial dynamics – such as global connectivity versus national digital sovereignty – complex tensions may emerge within national spaces. Digital technologies can simultaneously enable connection, fragmentation, disconnection, and even isolation. This highlights the need for research into the friction between goals like universal access and national cohesion, and emerging personalisation and individualisation in digital education. Studies should consider not only technological affordances but also disparities in digital access, participation, and control, as well as the underlying biases and polarisation that may fragment national spatial narratives.

The nation's digital transformation, timeline, and the synchronised tempo

National historical narratives

Regarding digital nationhood's temporal dimension, we first examine both continuity and disruption in the nation's narratives of its past, present, and future. From ancient cartography and

statistics to modern network engineering and computer science, there has been an enduring connection between scientific knowledge, technologies, and nation building (Möllers 2021). Digital transformation and the temporal dimension of nationhood may interweave in many ways. First, digital technologies' flexibility and interactivity mean they are expected to innovate engagement with history, allowing continuous and wider access to, as well as more entertaining interaction with, national history (Danniau 2013; Jama 2023). The extensive range of information and subjects generated on digital platforms may make nationhood and national history more relatable in daily life. As technologies advance, collective memories and historical heritages have been digitalised and brought online (Jama 2023). Through commemorations (presenting past events), historical analogies (explaining the link between the past, present, and future), and contextualising events mass media can transmit views of the past and future to broader audiences, thus reshaping collective memories (Birkner and Donk 2020).

Second, the construction of historical narratives and digitising historical sources in the digital realm are far from apolitical: they are a site of contestation between actors. Zaagsma (2023) observes that digital infrastructures such as online archives enable the (re)construction of specific temporal visions and play a significant role in the production of historical knowledge. The selection of digitised temporal discourses can shape perceptions of the nation.

Here, digital transformation again appears both to produce contradictory effects and to reinforce the status quo. On the one hand, this shift may lead to less centralised and inconsistent but more complex content and understanding of national history, challenging the received narratives that the ruling elites shape (Zaagsma 2023). Moreover, digital technologies foster a 'new media ecology' with more favourable conditions for democratisation and civil society activities in which new historical consciousness can be formed (Birkner and Donk 2020). On the other hand, centralised temporal discourses of nationhood can still be reproduced. The processes of taming time or (re)constructing the past (and future) via digital media, digital archives, and digital libraries still focus on selected national concerns and are remarkably influenced or carefully curated by states or other interested actors. Schneider's (2018) analysis of Chinese digital media highlights the persistence of a hierarchical media system in which the state tightly controls national narratives of sensitive historical events such as the Nanjing Massacre, leaving little room for alternative perspectives. Similarly, increasing political pressure and censorship limit historical interpretation in Russia, where digital archives are managed to uphold state authority (Golubev 2021). While these examples clearly reflect symbolic and ideological control, Schneider also emphasises the role of material and technical infrastructure. Digital tools like search engines, encyclopaedias, and hyperlinks can be deliberately structured to guide users towards state-approved narratives, reinforcing centralised versions of national history while marginalising dissenting views (Ringel 2021).

In education studies, Estonia provides an insightful case concerning the intertwining of digital transformation with the reconstruction of the nation's historical narrative and future vision. Estonia's ambition is to establish itself as 'e-Estonia' – an 'education nation' and a 'digital society' (Forsman et al. 2024; Piattoeva 2023; Savchenko, Lépinay, and Biagioli 2024). In this context, Estonia's digital transformation represents not only material technological advances but a symbolic severance from its Soviet past and a reorientation towards integration with the Western bloc (Forsman et al. 2024; Piattoeva 2023; Savchenko, Lépinay, and Biagioli 2024).

Although not directly focusing on nationhood, some recent studies of the politics of datafication and digitalisation can be re-examined through the lens of our research framework. Digitalisation accelerates the generation, calculation, and circulation of data (Williamson 2016) while introducing diverse methods for data visualisation and presentation. These processes not only reflect reality but actively construct and reconstruct the represented phenomena's past, present, and future (Mikhaylova and Pettersson 2025). Data visualisations selectively process and represent certain historical events or periods, thereby shaping the temporal narrative to prioritise particular perspectives, concerns, or agendas. Through comparisons enabled by data visualisations, various

actors, including international organisations, project competition between countries as nations. From this perspective, datafication can serve many purposes: while it may impose a global comparative logic that challenges national narratives, it can also be used to selectively reinforce preferred versions of history and the future, and to reinforce nations as relevant categories in policymaking and comparison.

The nation's tempo and synchronicity

While Özkırımlı's (2017) concept of the temporal dimension emphasises a historical continuity from past to future, we extend this to include speed, tempo, and national synchronicity. Simultaneously, invoking shared historical narratives serves to align the nation's pace and direction, fostering a sense of collective momentum. This synchronisation operates through both symbolic representations and material structures.

Digital technologies may overcome large distances and create a common tempo and rhythm for a national population (Lunde and Piattoeva 2025). A wide array of services, programmes, visions, and schemes from ministries, departments, and other actors is synchronised to interact using interoperable programmes that (promise to) provide seamless services to citizens. Platformisation can also contribute to harmonising tempo, uniting diverse isolated efforts within a single set of rules and practices. Platforms bring users together much like morning newspapers, as Anderson (2008) describes, synchronising readers through both curated and shared content – bringing the nation to them as a perceived totality – while enabling synchronous activities within a defined digital territory (Piattoeva and Vasileva 2023).

Williamson (2016) discusses how digital technologies fundamentally reshape the operation of the education system and nation as a whole by offering 'real-time' techniques for education governance. Piattoeva and Vasileva (2023) also highlight how managing time and producing synchronicity in national large-scale assessments (NLSA) becomes crucial in maintaining Moscow's centralised authority over Russia's vast territory, which spans multiple time zones. Their research underscores the interconnectedness between time, space, and nation. Regarding the symbolic aspect, the political essence of temporal organisation and management was revealed when 'taming' time zones became a means to highlight national territory and contribute to Russia's pride and cohesion as a nation. Meanwhile, materially, time-making and time zone management on the national scale increasingly depend on digital technologies and infrastructures to enable precise coordination across the country, for example. National tests (see also Lunde and Piattoeva's (2025) study of national testing in Norway) have examined how time can be deployed as a nation-making and governing tool. The authorities align the national education system to produce national unity by generating simultaneity and synchronicity (Lunde and Piattoeva 2025).

While digital technologies enable greater synchronicity, they can also introduce potential temporal disjuncture, underscoring their potentially paradoxical effects.

Digital tools may accelerate and bridge diverse temporal logics – personal, national, global, and machine time, but even then, these are not always seamlessly aligned. For example, national platforms promote synchronised activities, but personalised learning fosters individual pacing, leading to temporal fragmentation.

We propose to delve more deeply into the temporal dimension to explore: (1) externally, how digital technologies accelerate the national tempo to (re)position countries in the global 'race' (Savchenko, Lépinay, and Biagioli 2024); (2) internally, how these technologies construct or deconstruct a shared temporal framework that fosters a collective sense of pace and progression, connecting the nation and its citizens within a unified timeframe and cultivating temporal cohesion and synchronicity; and (3) similar to van de Oudeweetering and Decuypere's (2023) analysis of spatial rationales, how different temporal frameworks coexist within digital education, examining their alignment or disjunction with the national timeline and tempo.

Digital transformation, national identity, and the people

Nation branding and self-imaging in the world

Similar to our approach in the previous sections, the people dimension can be explored both externally and internally. Externally, we examine digital transformation's intertwining with a nation's self-imaging and self-differentiating in the global arena. Digital innovation is emerging as a core element of nation branding – a kind of soft power that enables nations to create distinct national identities in relation to others (Cheregi and Bargaoanu 2020). Symbolically, technological advances are discursively reinterpreted as national competitive advantages and symbols of national progress, which contribute to the nation's image and form part of national identity (Cheregi and Bargaoanu 2020). For example, the Digital India project exemplifies India's ambition of becoming a self-reliant nation capable of developing its own technology rather than merely catching up with the West (Dey et al. 2024). Estonia has also implemented a national strategy to rebrand itself as e-Estonia and an 'education nation' (Forsman et al. 2024; Kimmo, Pappel, and Draheim 2018; Piattoeva 2023; Savchenko, Lépinay, and Biagioli 2024). Such messages are actively promoted through policy slogans (Dey et al. 2024; Forsman et al. 2024) and showcased in various exhibitions, marketing materials, and public activities (Forsman et al. 2024; Savchenko, Lépinay, and Biagioli 2024). Beyond the symbolic aspect, constructing the identity of a digital nation – distinct from 'non-digital' ones (Cheregi and Bargaoanu 2020) – relies heavily on the acquisition of impressive material components essential to the success of digital nation branding strategies (e.g., electronic ID systems (e-Residency) (Kimmo, Pappel, and Draheim 2018) or digital platforms (NDEAR, Digital India, e-Estonia.com, etc)) (Dey et al. 2024; Savchenko, Lépinay, and Biagioli 2024).

National values, inclusion, and national communities

An internal perspective on the people dimension inspires us to pay attention to national values and identity; how the national population is defined, connected, and managed; and how various actors participate in nation making. It is noteworthy that the internal and external perspectives are closely linked, and as Forsman et al. (2024) argue, nation-branding strategies are directed at both international and national audiences.

National identities are materially embedded 'in the design and fulfillment of nation-specific scientific and/or technological projects' that at the same time symbolically describe values and future visions that ought to be shared and achieved (Jasanoff and Kim 2009, 120). Regarding material aspects, digital technologies' affordances may amplify or diminish certain elements while mediating national identity. Digital technologies and social media platforms may incorporate specific logic and designs for content moderation and selection, influencing user choices and shaping national narratives (Mihelj and Jiménez-Martínez 2021). For example, filter bubbles confine individuals to perspectives aligned with shared attitudes and beliefs, reinforcing particular versions of national identity and bolstering existing national frameworks (Mihelj and Jiménez-Martínez 2021). The digital ecosystem enables interaction with national symbols and celebrations of nationhood – as Zhang's (2020) reflection on the 70th Chinese National Day celebration exemplifies. From a symbolic perspective, advances in technological infrastructures may also be associated with national identity, fostering an 'imagined community' of nationals.

As we discussed in the previous sections, digital transformation has complex effects, both reinforcing and challenging national identity. While it offers exposure to diverse global perspectives, this can sometimes conflict with accepted national narratives, posing challenges for education in national identity (Li and Xia 2025). For example, Sari and Dahnial (2021) raise concerns that technological advances and digitalisation in Indonesia have diluted a sense of nationhood among young Indonesians by promoting Western culture and values. Despite the globalising effects of digital transformation, however, cyberspace continues to be shaped by national imaginaries and identity

(Shahin 2021). Tupasela (2022) argues that genetic technologies in Finland are used to project normative ideals of Finnishness. In countries like India, digital education policies often highlight technology's role in preserving national heritage and culture, reinforcing national identity through innovation (Dey et al. 2024).

National identity's reinforcement or transformation is linked to inclusion in the national community. As Huijsmans and Lan (2015) state, digital technologies and services may prioritise national languages in their design, which can marginalise unwritten minority languages and endanger the preservation of minority cultures. Inherent features of the digital infrastructure may, in some cases, even contribute to conditions conducive to exclusion and hate speech (Estellés and Castellví 2020; Ott 2017). For example, Bhatia (2022) points out that some features of Twitter (now known as X) have contributed to disseminating exclusionary Hindu nationalism. Moreover, when the production and utilisation of population data are foregrounded, digital technologies can promote 'statistically average' understandings of normality and national identity, amplifying cultural homogenisation, assimilation, and social biases, while overlooking individual particularities (Goode 2021).

Citizenship and national population management are also transformed. Efforts to nationalise technology, as in Germany, not only project national identity but also redefine digital citizenship by determining who qualifies as an ideal citizen and who should be included/excluded as a member of the national community (Möllers 2021). Specific initiatives like Estonia's e-residency programme that aim to promote digital nation branding expand traditional citizenship notions. E-residency allows individuals worldwide to obtain a secure digital identity issued by the Estonian government (Kimmo, Pappel, and Draheim 2018). Although the programme does not grant formal citizenship, it lays the foundation for reimagining transnational identity and digital citizenship, challenging the national community's traditional boundaries. In such reconceptualisations of 'citizen' and 'citizenship', technologies' representational function may not always be directly aligned with technical functions.

As the ambition of building a 'digital nation' requires both digital citizens and a digital society, education is expected to play a vital role in realising these imaginaries. Digital education initiatives in India often cultivate an image of a cohesive digital nation, where digital literacy and citizen empowerment are assumed to be universally supported. Within this rhetoric, societal complexity, diversity, differences, and disconnections can be fundamentally reconfigured and sometimes oversimplified as issues technology can solve (Dey et al. 2024). Digital infrastructure and platforms that claim to promote transparency and democratic access for 'everyone, everywhere, at all times' may instead reinforce hierarchies and barriers to participation and inclusiveness, or exacerbate the digital divide and amplify pre-existing education inequalities (Hill and Lawton 2018; Kalyan Shankar, Sahni, and Roy 2024).

The people dimension also extends to discussions of social participation, reflecting a broadening range of actors involved in nation building in the digital era. Entities both inside and outside nation-states, including profit-driven private actors, enable digital transformation, increasing their role in shaping national identity (Ljungqvist and Sonesson 2022; Mihelj 2023; Mihelj and Jiménez-Martínez 2021; Piattoeva and Gurova 2021). This invites us to study digital tools (e.g., databases, education management information systems (EMIS), linkages across websites, etc.) as nationalising tools, and state and emerging commercial actors as ethnopolitical entrepreneurs. These may include, but are not limited to, domestic and international entities developing AI or collecting and processing population data, innovators, scientists, engineers, tech companies, and non-human actors such as AI (Ahmad 2022; Goode 2021; Möllers 2021; Musiani 2022). Nationhood may therefore be less solely defined by the state (Mihelj and Jiménez-Martínez 2021). This is a significant question for public education's future: how will the state's historical role be impacted by the rise of digital technologies and the growing involvement of non-state actors?

It is critical, however, that other social actors' increased role does not necessarily challenge state power in nation making; instead, it introduces complex new dynamics that necessitate deeper

investigation. First, as we noted earlier in the article, there are ongoing attempts to preserve or restore state sovereignty and control of the digital world, especially in sectors with a direct impact on a country's competitiveness (Montresor 2001), and this ambition may affect and be materialised in the sphere of education. By exerting influence on platforms, states can effectively regain control of national narratives and material resources. Symbolically, the state can also promote normative ideologies and nationalist discourses to justify its intervention. Second, the emergence of new actors may not contradict the state's role. Non-state actors harness digital technologies to produce nationhood as a resource for the promotion of digitalisation; and there is a growing entanglement of state and other actors. As our theoretical discussion argues, non-state actors' nationalising actions are not always strategic but may be triggered by the omnipresence of nationalism and thus reproduced unintentionally.

Discussion

This paper aims to develop a research framework for studying national socialisation in education amid the rapid digital transformations reshaping societies. In doing so, we engage conceptually and methodologically with the deep and often paradoxical consequences of digital transformation for education and education research. We aim to connect the fields of nationalism, education, and digital transformation and propose ways forward for researchers navigating these evolving areas. Our framework systematically examined three interrelated dimensions of nationhood and nationalist discourse – space, time, and people. By considering both internal and external perspectives, we highlighted the complex, dynamic, and open-ended nature of defining the nation in and through digital education, as summarised in the table in the Appendix. As a strategic national institution tasked with both shaping ideological values and enhancing productivity, the education system is a cornerstone of nation building (Peters and Besley 2024). Our framework offers a lens for a critical reassessment of the complex entanglement between digital transformation, education, and nationalist agendas, highlighting digital transformation's dual role in reinforcing and challenging education's nation-building functions. While many studies portray digital transformation as a contemporary rupture marked by disruption and replacement, we emphasise the importance of historical sensitivity towards the origins of state education. Recognising education's sociohistorical roots and enduring functions in shaping nationhood helps highlight how these roles persist and evolve in the digital era.

Rather than treating digital technologies as neutral or passive tools for conveying national discourses, we emphasise their agentic role through discursive practices and technical affordances. Digital technologies act as agents with generative and connective capacities, capable of (re)shaping social understandings and practices, including those related to the nation, nationhood, and nationalism. Conversely, education and nationhood are not merely affected by digital transformation; they are also actively involved in and co-constitutive of the process of technological change.

Given the multifaceted impact of digital transformation, we recognise that a single definitive assessment is unlikely. All three dimensions undergo both continuity and change in the context of digital transformation, which unfolds through material and symbolic elements. Long-term and context-specific investigations are needed to develop a more nuanced understanding of how identities evolve and are interrelated in the digital age, as well as to reveal the paradoxes of digital education: connection and disconnection; continuity and disruption; decentralisation and recentralisation. While it aspires to 'everyone, everywhere, every time', it simultaneously generates new frictions and forms of exclusion.

In contributing to the discussion of transforming educational research methodologies in the digital era, our analytical framework not only enables a critical re-examination of existing research but also allows scholars to reinterpret existing findings to derive new insights and formulate novel research questions. Furthermore, by adopting a social constructionist lens on nationalism, our framework inherently challenges fixed and simplistic understandings of the relationships between technology, education, and the nation. We encourage a multi-methodological approach and

innovative research methods transgressing established divides. For example, by incorporating both the material and symbolic dimensions of digital transformation, our framework proposes a possible integration of discursive analytical methods which aptly serve an exploration of the symbolic construction of nationhood, with more technical analyses of the material aspects of digital infrastructures in digital education (e.g., network, data flow, algorithm, interface analysis, etc.). Our symbolic aspect of digital technologies calls for an engagement with technologies' imbuement with values and political ambitions. This, in turn, necessitates a critical examination of the epistemologies of data and algorithms and how they might reproduce or reconfigure national narratives. Such a combination facilitates a more holistic understanding that transcends purely technical evaluations or merely socio-discursive interpretations.

Notes

In this paper, we used AI tools such as ChatGPT, Gemini (2.5 Flash), and Grammarly to refine the text by (1) checking spelling and grammar to enhance language clarity and fluency, and (2) rephrasing and word cutting to meet the wordcount. These tools were employed strictly as support for linguistic and stylistic improvements, without contributing to the paper's substantive analysis, interpretation, or original content generation.

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Appendix

Table A1. Research framework and agenda summary.

		Material aspect	Symbolic aspect	Relevant education studies: revisiting and reconnecting
SPACE	**External perspective: nation's positioning, territory, and borders**	- National borders and territories online: reproduced and redefined. • Moves beyond geographical territories • Bounces between multiple spatial rationales - State sovereignty over national cyberspace: challenged but sustained. - Global online networks: less nation-bound? - National digital ecosystems – formed by national domains, search engine algorithms, recommendation settings, and hyperlinks	- Digital infrastructures as national ambitions and contested arenas - Symbolic nationalisation of digital space to promote normative ideas of the nation - Digital choices (e.g., of domain names) as attachment/detachment from the nation	- Trans-locality via digital education platform **Further research**: - How do different kinds of digital education platforms/ technologies interact materially and symbolically to shape national spatiality?
	Internal perspective: embedding nationals into the national space	- National space in the digital era: connection, disconnection, and fragmentation - Digital technologies facilitate connection to national digital spaces	- The discourse/ideology of 'flattening nation'	- The design of digital services in embedding minorities into the national cyberspace? - Online education platforms as 'flat virtual space'? **Further research:** - Friction between universal national access and individualisation in digital education - Various forms of digital disparities and biases in digital education?
TIME	**National historical narratives**	- Diversification and decentralisation alongside recentralisation of national historical narratives. - Digital technologies enable new ways to engage with national history	- Digitising history: a political contest over national time. - Patriotic ideologies in historical narratives - Digital innovation as symbol of continuity/disruption, and future leaps	**Further research:** - Re-examine the politics of datafication and digitalisation of history in digital education
	The tempo and synchronicity of the nation	Digital time and the nation: • Potential of non-linear time vs linear control of time • Nation's synchronicity and temporal disjuncture - Digital technologies: accelerating the nation, streamlining citizen services, and synchronising national tempo	- 'Taming' national time: digital technologies and ideological attempts to highlight the nation's collective momentum, pride, and cohesion.	Practices for generating synchronicity in digital education to produce national unity. (e.g., 'real-time' governance techniques)Further research:Coexistence of various temporal rationales in digital education: aligning or disjoining national time?

(*Continued*)

Table A1. Continued.

		Material aspect	Symbolic aspect	Relevant education studies: revisiting and reconnecting
PEOPLE	**External perspective: Nation branding and self-imaging**	- 'Digital nation' as national branding strategy. - Digital technologies create technical bases for nation branding	- Digital innovation as a symbol of national progress or uniqueness	- Digital education as a component of nation branding
	Internal perspectives: national identity, citizen inclusion, and population management	- National identities in the digital era: reinforced and challenged - Perceptions of citizen and population governance are being redefined: - Emerging actors, enduring state power in nation making: no linear decentralisation - Digital technologies can influence people's behaviours • Amplify or dissolve national values • Include/exclude certain groups - Population management: from people management to data management	- 'Online imagined community': virtual space for interacting and expressing nationhood symbolically - Technology nationalisation projects also accompany ideological work to redefine national values and the ideal citizen - Digital innovation symbolises various national fantasies to connect people and validate state strategies	- Education is vital in shaping imaginaries of 'digital citizens' and 'digital societies' - Citizen empowerment and cohesive digital nation imaginaries in/through digital education vs sustained societal complexities' and diversities' oversimplification as technical problems? **Further research:** - Study digital education tools as nationalising tools - Examine state and emerging actors as ethnopolitical entrepreneurs Reconsider the evolving roles of the state and other digital education actors in nation making