

Language Maintenance Strategies in the Digital Era: A Literature Review of Linguistic Transformation and Barriers to Language Preservation

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ARTICLE INFORMATION

Article History:	ABSTRACT
Published: 24 October 2026	The development of digital technology has transformed language use, including minority, Indigenous, and regional languages, while creating both opportunities and challenges for language maintenance. This study aims to analyse linguistic transformation in digital environments, identify technology-based language-maintenance strategies, and examine barriers affecting sustained language use. It employs a qualitative literature review using scholarly publications and policy documents, primarily published between 2018 and 2026. A supplementary ScienceDirect search returned 213 records, of which 198 were unique, 22 were identified as relevant through title-and-abstract assessment, and 10 were integrated into the thematic synthesis. The findings identify five major strategies: expanding language-use domains, forming virtual communities, digitising linguistic documentation and resources, supporting technology-based language learning, and strengthening language identity and prestige. Major barriers include technological inequality, limited linguistic resources, the gap between digital visibility and language vitality, and programme sustainability. The study concludes that digital technology supports language maintenance when integrated with active language use, community participation, learning, intergenerational transmission, and sustained institutional support.
Keyword: language maintenance, digital technology, language revitalisation, linguistic transformation, digital language vitality.	
Kata Kunci: pemeliharaan bahasa, teknologi digital, revitalisasi bahasa, transformasi linguistik, vitalitas bahasa digital.	ABSTRAK Perkembangan teknologi digital telah mengubah pola penggunaan bahasa, termasuk bahasa minoritas, bahasa masyarakat adat, dan bahasa daerah, sekaligus membuka peluang dan tantangan bagi pemeliharaan bahasa. Penelitian ini bertujuan menganalisis transformasi linguistik di ruang digital, mengidentifikasi strategi pemeliharaan bahasa berbasis teknologi, serta mengkaji hambatan yang memengaruhi keberlanjutan penggunaan bahasa. Penelitian menggunakan metode tinjauan pustaka kualitatif dengan sumber data berupa publikasi ilmiah dan dokumen kebijakan, terutama yang diterbitkan pada 2018–2026. Penelusuran tambahan melalui ScienceDirect menghasilkan 213 rekaman, dengan 198 sumber unik, 22 sumber relevan berdasarkan penilaian judul dan abstrak, serta 10 sumber yang diintegrasikan ke dalam sintesis tematik. Hasil penelitian mengidentifikasi lima strategi utama, yaitu perluasan ranah penggunaan bahasa, pembentukan komunitas virtual, digitalisasi dokumentasi dan sumber kebahasaan, pembelajaran berbasis teknologi, serta penguatan identitas dan prestise bahasa. Hambatan utamanya meliputi ketimpangan teknologi, keterbatasan sumber kebahasaan, kesenjangan antara visibilitas digital dan vitalitas bahasa, serta keberlanjutan program. Penelitian menyimpulkan bahwa teknologi efektif mendukung pemeliharaan bahasa apabila terhubung dengan penggunaan aktif, partisipasi komunitas, pembelajaran, pewarisan antargenerasi, dan dukungan berkelanjutan.
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DOI: https://doi.org/10.36709/pesastra.v3i4.183	

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Introduction

Digital technology development has changed the environments of language use, in learning, dissemination and everyday communication practices (Pinto, 2025). The interactions that were carried out through face-to-face communication, print media, families and educational institutions are now increasingly taking place through social media, messaging applications, video platforms, online forums, digital dictionaries and artificial intelligence based technologies (Pinto, 2025). These changes do not only transfer language use into new media. Digital spaces also influence language choice, linguistic variation and the majority–minority language relationship. Digital communication shows changes in the appearance of abbreviations, phonetic spelling, linguistic simplification, and the development of new communicative registers (Panjaitan and Patria, 2024).

This phenomenon is important to the study of language maintenance because the viability of a language depends not only on the number of speakers but also on whether the language continues to have domains of use and mechanisms of transmission. In the Indonesian context, intergenerational transmission and domains of use are central to language vitality. Badan Pengembangan dan Pembinaan Bahasa (Badan Pengembangan dan Pembinaan Bahasa, 2022) reported that 718 regional languages had been recorded in Indonesia as of 2019, while some languages were classified as extinct, critically endangered, endangered, declining, or vulnerable. This national context illustrates why documentation alone cannot be equated with language maintenance: a language must also remain connected to social use, learning, and transmission within its community.

The movement of languages into digital spaces creates both opportunities and risks. Digital platforms can open domains of use that were previously difficult to access for minority languages. Social media, in particular, allows speakers to communicate, produce content, and construct linguistic identity without complete dependence on formal institutions. Belmar and Glass (2019) describe virtual communities as "breathing spaces" in which minority languages can be used with less pressure from dominant-language norms. Belmar (2020) similarly shows that an Aragonese-speaking Facebook community can connect minority-language use with identity and contemporary social life

Digital technology also plays a part in language learning and documentation outside of social media. Research by Outakoski et al., (2018) shows that digital media, such as YouTube, blogs, Twitter and learning applications, can be used as tools for developing language resources for the Sámi communities. In another context, Mayeux (2024) shows that the Louisiana Creole digital community has grown into a space for learning, materials development, and language activism as well as a space for communication. Both studies show that digital media can contribute to revitalisation, provided communities are engaged in communication, learning and development of language resources.

However, digital technology does not automatically result in language maintenance. It can expand opportunities for communication, learning, and documentation, but its contribution depends on whether technological resources are both available and responsive to the practices of the speech community. Meighan (2021) emphasizes that technology-enabled language revitalization should respond to community needs and be embedded in culturally meaningful contexts rather than rely on decontextualized language-learning materials. Such an approach may better support language use in everyday social domains. This emphasis suggests that digital interventions detached from their sociocultural context may have limited value for sustaining actual language use. At the same time, access to such technologies is uneven: Simons et al. (2022) report substantial differences in digital support across languages, particularly in the tools, services, and technological resources that enable languages to function in digital environments.

A further problem is that a language's presence in digital spaces does not necessarily mean that the language is being successfully maintained. There may be plenty of online content for a language but it might not be used actively by younger generations or not transmitted within families. Thus, language maintenance in the digital era should not be seen merely as a question of the inclusion of the languages in technology but as a process of maintaining the link between language use, speaker communities, learning and intergenerational transmission (Torsh, 2026). From this perspective, linguistic change through digitalisation does not necessarily indicate decline. Language mixing or use of multimodal forms or adaptation to new media can be strategies of continuity as long as the language continues to be used for social functions within its community.

Previous research on language and digital technology can be organised into three broad strands. The first examines linguistic transformation within digital communication, including simplification, nonstandard forms, new communicative registers, and linguistic hybridisation (Panjaitan and Patria, 2024). This strand demonstrates how digital environments reshape forms of language use, but its primary concern is linguistic change rather than the conditions under which such change contributes to continued language use. The second strand examines digital media as spaces for revitalisation, learning, communication, and minority-language community building (Belmar, 2020; Belmar and Glass, 2019; Mayeux, 2024; Outakoski et al., 2018). These studies show how virtual communities can create opportunities for speakers and learners to interact, develop materials, and participate in revitalisation activities. The third strand focuses on the technological conditions that enable or constrain digital language use, particularly the availability of linguistic resources, technical support, and technologies that respond to community needs (Simons et al., 2022; Meighan, 2021).

Although these three strands provide important evidence, they tend to illuminate different parts of the same problem. Research on linguistic transformation explains how language practices change in digital environments; revitalisation research demonstrates how speakers and communities use those environments; and technology-oriented research identifies the infrastructural conditions that make such use possible or difficult. What remains less integrated in the literature reviewed here is the relationship among these dimensions: how linguistic adaptation, technology-based maintenance strategies, community participation, and digital barriers interact in shaping the continuity of minority and regional languages. This gap is important because digital presence alone cannot indicate whether a language is being maintained unless that presence is connected to actual use, learning, community participation, and intergenerational transmission.

In this context, language maintenance in the digital era cannot be fully understood solely through changes in linguistic form or the availability of digital content. It requires an integrated analysis of how linguistic adaptation, technological resources, community participation, language learning and transmission, and long-term institutional and community support interact in sustaining language use. Based on recurring patterns identified across the reviewed literature, this study develops an author-derived synthesis framework that conceptualises digital language maintenance through five interrelated dimensions: digital presence, digital usability, digital participation, language learning and transmission, and institutional and community sustainability. These dimensions are understood as mutually connected rather than as a fixed linear sequence, because the literature shows that a language may have extensive digital documentation without corresponding levels of active participation or intergenerational transmission, while communities may maintain active language practices despite limited technological support.

Accordingly, this study aims to analyse linguistic transformation in digital spaces, identify technology-based strategies for language maintenance, and map the barriers that limit the development of digital presence into sustained language use and vitality. The conceptual

contribution of the study lies in integrating these dimensions within a single interpretive framework that distinguishes the mere digital presence of a language from the broader social, technological, and community conditions required for its continued use.

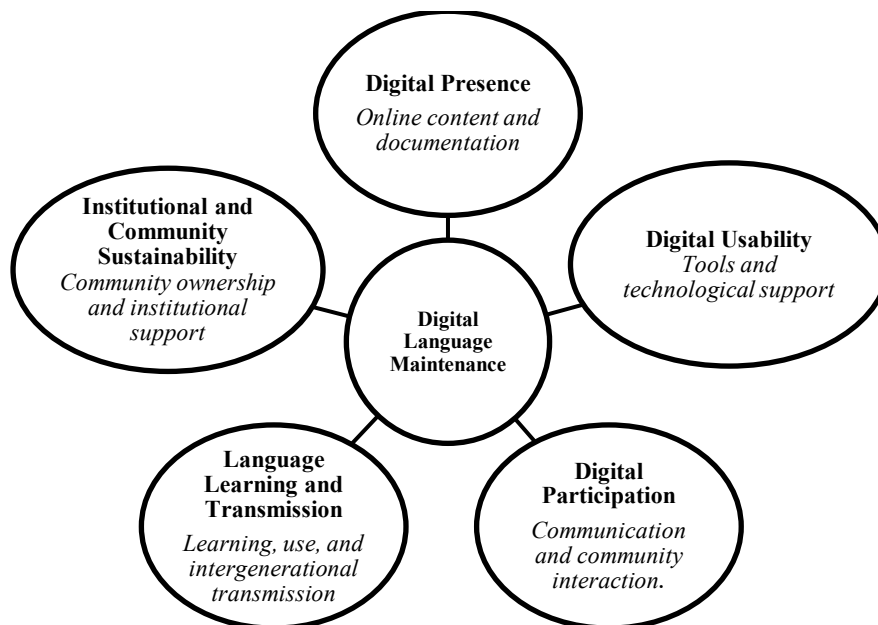


Figure 1. Author-Developed Synthesis Framework for Digital Language Maintenance

As illustrated in Figure 1, digital language maintenance is conceptualised as an interconnected process in which digital presence, digital usability, digital participation, language learning and transmission, and institutional and community sustainability mutually support the continued use of a language. These dimensions are not sequential stages but interdependent components whose interaction shapes the extent to which digital presence can contribute to sustainable language vitality.

Method

This study employs a qualitative literature review. This approach was selected because the object of the study is not the behaviour of particular informants, but the body of scholarly knowledge concerning linguistic transformation, language maintenance, language revitalisation, digital vitality, and the use of technology in language communities. A literature review can function as a research method when its design, search, analysis, and presentation are conducted systematically and transparently rather than merely summarising previous studies (Snyder, 2019)

The review draws on scholarly publications and policy documents containing empirical or conceptual discussions of language in digital environments. Priority was given to publications from 2018 to 2026 in order to capture recent developments in digital communication, language technology, and language-maintenance research. Earlier methodological and conceptual sources were retained where necessary to support the review procedure and conceptual interpretation. To strengthen the transparency and evidential basis of the review during manuscript revision, a supplementary literature search was conducted through ScienceDirect on 2 September 2026, with publication years limited to 2018–2026.

The supplementary search used five combinations of search terms: “language maintenance” AND “digital technology”; “language revitalization” AND “social media”; “digital language vitality” AND “minority language”; “indigenous language” AND “digital technology”; and “regional language” AND “language change”. The five searches returned 213 records in aggregate. After duplicate records were identified, 198 unique records remained. A title-and-abstract assessment identified 22 publications as directly relevant to the analytical focus of the review. A stricter assessment of their alignment with linguistic transformation in digital communication, technology-based language-maintenance and revitalisation strategies, and digital barriers affecting minority, Indigenous, and regional languages resulted in 10 sources being retained from the supplementary search and integrated into the thematic synthesis.

Sources were assessed according to their substantive relevance to the review questions. Publications focusing on technological developments without a meaningful connection to language were not used as the primary basis of the synthesis. Similarly, studies of digital language use that did not provide relevant evidence or conceptual insight concerning language change, maintenance, vitality, or revitalisation were not used to support the main thematic findings. No formal numerical quality-appraisal instrument was applied. Instead, sources were considered in relation to their direct relevance to the review questions, the clarity of their empirical or conceptual basis, and the extent to which their findings could support the thematic interpretation. Empirical studies were used primarily to identify reported language practices and outcomes, conceptual publications to support interpretation, and policy documents to provide institutional and language-policy context. These source types were therefore interpreted according to the nature of the evidence they provided rather than treated as evidentially identical.

Data were analysed using thematic analysis. Following Braun and Clarke (2021), themes were treated as interpretive patterns developed in relation to the review questions rather than merely as summaries of recurring topics. The unit of coding consisted of meaning-bearing passages and reported findings relevant to linguistic transformation, technology-based language-maintenance strategies, community participation, language learning and transmission, digital resources, and barriers to sustained language use.

The analysis involved repeated reading of the literature, assigning conceptual codes to relevant passages and findings, comparing similar and contrasting evidence across sources, grouping related codes into broader categories, and developing interpretive themes. Individual sources could contribute to more than one theme because the categories were analytically related rather than mutually exclusive. Coding was conducted by both authors. The contribution of individual sources to the major strategy and barrier themes is reported in Tables 1 and 2. The relationships among these themes subsequently informed the five dimensions of the author-developed synthesis framework: digital presence, digital usability, digital participation, language learning and transmission, and institutional and community sustainability.

Result

Language maintenance in the digital era takes place through changes in patterns of language use, the expansion of communication domains, the development of virtual communities, the digitization of linguistic resources, technology-based learning, and the strengthening of language identity and prestige. At the same time, the literature also identifies several challenges, including the dominance of majority languages, technological inequality, limited digital resources, the gap between digital visibility and intergenerational transmission, and issues related to program sustainability.

Transformation and Strategies for Language Maintenance in the Digital Era

The synthesis of the literature demonstrates that language transformation in the digital environments takes place at least at two interrelated levels: changes in forms of communication and changes in the domains of language use. At the level of form, digital communication encourages a more economical, fast, multimodal and adaptive to platform characteristics use of language. Panjaitan and Patria (2024) state that the simplification, abbreviations, phonetic spelling, and nonstandard structures are part of language evolution in social media communication. The results suggest that digitalisation does not simply transfer language practices from offline media to digital spaces, but also produces new communication conventions.

A similar pattern is evident in the use of Cymraeg on TikTok, where bilingual practices involving Cymraeg and English occur alongside the continued use of Cymraeg for communication, learning, discussion, and content creation (Cunliffe, 2025). The coexistence of local and global languages is also evident in digital communication practices in Southeast Asia (McLellan, 2023). These hybrid practices suggest that linguistic transformation in digital environments may involve adaptation and language mixing while minority and local languages continue to perform communicative functions. Evidence from New Zealand Sign Language further illustrates this process. McKee et al. (2025) show that online video texts can provide a context for genre development and stylistic variation, demonstrating that the movement of a minority language into new media may be accompanied by changes in linguistic practice rather than simply language loss.

Beyond changes in linguistic form, the literature identifies several interrelated strategies through which digital environments may support language maintenance. These include the expansion of language-use domains, the formation of virtual communities, the digitalisation of documentation and linguistic resources, technology-based language learning, and the strengthening of language identity and prestige. Table 1 summarises these strategies and the principal sources supporting each theme.

Table 1. Language Maintenance Strategies in the Digital Era Based on the Literature Synthesis

Strategy	Findings from the Literature	Representative Supporting Sources
Expansion of domains of language use	Use of the language in social media, conversations, comments, content, education, humor, cultural discussions, and expressions of identity.	Belmar and Glass (2019); Belmar (2020); McLellan (2023); Cunliffe (2025); McKee et al. (2025)
Formation of virtual communities	Digital communities as spaces for communication, learning, activism, materials development, resource sharing, and mutual support among speakers	Belmar and Glass (2019); Belmar (2020); Outakoski et al. (2018); Mayeux (2024); Hasugian et al. (2026)
Digitalization of documentation and linguistic resources	Development of dictionaries, corpora, audio, video, orthographies, keyboards, applications, and digital linguistic resources.	Simons et al. (2022); Hadiwijaya et al. (2022); Wise and Kostecky (2018); Bharti and Singh (2022); Cunliffe et al. (2022)
Technology-based language learning	Use of social media, applications, virtual communities, and digital learning resources to improve language proficiency.	Outakoski et al. (2018); Mayeux (2024); Li et al. (2021); Koole and Lewis (2018); Stone and Anonby (2019); Koole et al. (2023)
Strengthening language prestige and identity	Use of digital media to increase visibility, recognition of the language, community identity, and the connection between the language and contemporary life.	Belmar (2020); Manan et al. (2021); Wang et al. (2024); Galla et al. (2023)

One recurring strategy identified across the literature is the expansion of language-use domains into digital spaces. As communication, education, entertainment, cultural discussion,

and identity expression increasingly take place through digital media, minority and regional languages require opportunities to function within these environments. Belmar and Glass (2019) conceptualise virtual communities as “breathing spaces” in which minority-language speakers can use their languages without constantly conforming to communicative norms dominated by majority languages. Belmar (2020) similarly shows that an Aragonese-speaking Facebook community can create an additional domain for minority-language communication and identity expression.

The expansion of digital domains is closely connected to the formation of virtual communities. Technology can connect speakers, learners, teachers, activists, and resource developers across geographical boundaries. Mayeux (2024), for example, shows that the Louisiana Creole Virtual Classroom functions as a space for language learning, activism, materials development, and orthographic discussion, with some activities extending beyond the digital platform into broader revitalisation efforts. Outakoski et al., (2018) identify a similar pattern among Sámi communities, where digital media support learning, resource sharing, and communication among users. Hasugian et al. (2026) further show that social information systems for endangered-language revitalisation can integrate access to digital materials, interactive learning, corpus development, and social interaction.

Another strategy identified in the literature is the digitalisation of language documentation and linguistic resources. Digital dictionaries, corpora, audio and video recordings, learning materials, orthographies, archives, keyboards, and language-processing resources provide infrastructure through which languages can be documented, learned, and used technologically. Simons et al. (2022) demonstrate substantial differences in the levels of digital support available across languages, indicating that a language's capacity to function in digital environments is closely connected to the availability of technological and linguistic resources. In the Indonesian context, BPP Bahasa (2022) also identifies corpora as an important resource for language development and language technologies. Hadiwijaya et al. (2022) similarly position the development of digital resources as part of the conservation and revitalisation of regional languages in Indonesia.

Recent studies further illustrate the different functions of such resources. Wise and Kostecky (2018) show that collaboration with Zuni community members improved the description, discoverability, and interactivity of digitised language-learning materials. Bharti and Singh (2022) demonstrate that the technological platforms used to create digital language archives influence how endangered-language materials can be managed and accessed. At the level of language technology, Cunliffe et al. (2022) show that adapting existing natural-language-processing infrastructure for Cymraeg can provide a practical approach to developing technological support for an under-resourced language. These findings indicate that digital documentation is not only concerned with preserving linguistic materials but also with increasing their accessibility and usability.

Technology-based language learning constitutes another recurring strategy. Outakoski et al. (2018) demonstrate how social media and digital technologies can support Sámi language learning, while Mayeux (2024) shows how participation in a digital language community can support learning that later connects with wider revitalisation activities. Li et al. (2021), based on a systematic review of empirical studies, similarly identify digital technologies as potentially useful resources for supporting Indigenous language and literacy learning.

Other studies emphasise that the effectiveness of digital learning depends on design and community context. Koole and Lewis (2018) argue that mobile learning for Cree should take cultural, pedagogical, technological, and environmental conditions into account, including contexts with limited or no internet bandwidth. Stone and Anonby (2019) highlight collaborative cybercartography as a possible means of strengthening Indigenous language education and community-based transmission. Koole et al. (2023), through the Nisotak project,

demonstrate how a web-based lesson-creation system and mobile learning application can accommodate multiple dialects, prioritise target languages, remain accessible to non-technical users, and facilitate the transfer of ownership and management to the community.

However, the availability of technology is not always accompanied by adequate linguistic and learning resources. Mlaba et al. (2025) find that digital resources for Nluu revitalisation remain limited in their accessibility through the internet and social media. Meighan (2021) likewise emphasises that technologies used in Indigenous-language revitalisation need to respond to community knowledge, practices, and priorities. These findings indicate that technological availability alone does not determine the effectiveness of digital language-maintenance initiatives.

Beyond communication and learning, digital environments may also strengthen language identity and prestige. Belmar (2020) shows that online presence can connect minority languages with contemporary life and increase awareness of linguistic diversity. Manan et al. (2021) identify close relationships between language revitalisation and community identity in the Torwali context, while Wang et al. (2024) demonstrate the role of social media in minority-language revitalisation. Galla et al. (2023) further emphasise community-centred language practices, Indigenous self-determination, intergenerational knowledge relations, curriculum, media, and technology as interconnected elements of language recovery and renewal. Taken together, these findings show that language maintenance in digital environments involves not one isolated intervention but a combination of communicative domains, communities, linguistic resources, learning opportunities, and identity-related practices.

Barriers to Language Maintenance in the Digital Era

Alongside these opportunities, the literature identifies several barriers to language maintenance in digital environments. These barriers involve inequalities in technological support, limited linguistic and learning resources, differences between digital visibility and actual language vitality, and challenges related to the sustainability and community ownership of digital initiatives. Table 2 summarises these themes.

Table 2. Barriers to Language Maintenance in the Digital Era Based on the Literature Synthesis

Barrier	Findings from the Literature	Representative Supporting Sources
Dominance of majority languages and digital inequality	Languages with fewer linguistic and computational resources may receive less support from keyboards, applications, search systems, speech technologies, and language-processing tools.	Simons et al. (2022); Cunliffe et al. (2022)
Limited resources and accessibility	Limited corpora, learning materials, documentation, connectivity, and accessible digital resources can constrain language learning and technological development.	Mlaba et al. (2025); Koole and Lewis (2018); Cunliffe et al. (2022); Li et al. (2021)
Gap between visibility and vitality	A language may be visible through content, applications, dictionaries, or social media without necessarily being actively used in everyday interaction or transmitted across generations.	BPP Bahasa (2022); Mayeux (2024); Torsh (2026)
Program sustainability and community ownership	Dependence on particular platforms, technologies, funding, or externally controlled projects can limit long-term sustainability, while community participation and ownership can strengthen continuity.	Meighan (2021); Wise and Kostelecky (2018); Koole et al. (2023); Galla et al. (2023)

The first barrier concerns inequalities in technological support. Digital environments do not provide equivalent levels of functionality for all languages. Languages with extensive linguistic data, institutional support, and computational resources generally have greater opportunities to benefit from contemporary language technologies. Simons et al. (2022) demonstrate substantial disparities in technological support across languages, while Cunliffe et al. (2022) show that under-resourced languages face significant challenges in developing the language resources needed for natural-language-processing applications. Speakers of low-resource languages may therefore face barriers not only in accessing digital tools but also in having their languages processed effectively by digital systems.

These inequalities are closely connected to limitations in linguistic resources and accessibility. Mlaba et al. (2025) show that limited access to Nluu digital resources constrains revitalisation activities. Koole and Lewis (2018) likewise highlight the need to design language-learning technologies for environments characterised by low or absent internet bandwidth. The problem becomes increasingly significant as language technologies require adequate corpora and other structured linguistic resources. (BPP Bahasa (2022) similarly identifies corpus development as an important element in contemporary language development. Limited linguistic resources can therefore constrain both language learning and the development of new technological support.

Another barrier concerns the distinction between digital visibility and language vitality. A language may be represented in videos, posts, applications, dictionaries, or other digital materials without necessarily being actively used in everyday communication or transmitted from one generation to the next. BPP Bahasa (2022) identifies intergenerational transmission and domains of use as important indicators of language vitality. Torsh (2026) likewise highlights the continuing importance of family and parental practices in heritage-language maintenance in increasingly digital environments. By contrast, the case described by Mayeux (2024) illustrates how digital learning may contribute to competence, participation, and revitalisation activities that extend beyond the platform. These findings indicate that digital visibility should not automatically be equated with sustained language use.

The final barrier concerns program sustainability and community ownership. Digital projects can become vulnerable when they depend heavily on particular technologies, platforms, funding arrangements, or external organisations. Meighan (2021) emphasises that language technologies should respond to the needs and knowledge of Indigenous communities. Wise and Kosteletzky (2018) demonstrate that direct collaboration with community members can improve the accessibility and relevance of digitised language materials. Similarly, Koole et al. (2023) explicitly incorporate the transfer of ownership and management into the design of an Indigenous-language learning system. Galla et al. (2023) place Indigenous self-determination and community-centred practice at the core of language recovery and revitalisation. These findings suggest that long-term digital language maintenance depends not only on technological continuity but also on meaningful community involvement in developing, managing, and using language resources.

Discussion

Digital Language Maintenance Ecosystem

Overall, the findings indicate that digital language maintenance cannot depend on a single strategy or technological intervention. Sustainable language use emerges from relationships among technological support, linguistic resources, social use, learning, identity, community participation, intergenerational transmission, and institutional support. Technology is therefore more appropriately understood as one component within a broader language-maintenance ecosystem rather than as an independent solution.

This interpretation is consistent with Meighan (2021), who emphasises the importance of developing technologies in relation to community needs and knowledge. Simons et al. (2022) further demonstrate that technological support is distributed unevenly across languages, while Cunliffe et al. (2022) illustrate how under-resourced languages may face difficulties in obtaining the linguistic and technological infrastructure required for natural-language-processing applications. Technological inequality therefore does not exist independently of linguistic resources, accessibility, community capacity, and institutional support.

A similar socio-technical perspective can be identified in Hasugian et al. (2026), whose review of social information systems for endangered-language revitalisation connects corpus development, access to digital materials, interactive learning, and social interaction. These findings reinforce the interpretation adopted in the present study that effective digital language maintenance depends on connections among technological infrastructure, linguistic resources, learning opportunities, and actual community participation.

The findings also highlight the importance of distinguishing digital visibility from language vitality. A language may have substantial numbers of digital materials, applications, posts, views, or followers without necessarily being used actively in everyday communication or transmitted across generations. Digital indicators therefore provide evidence of visibility and availability but should not by themselves be interpreted as evidence of successful language maintenance. Studies such as Belmar and Glass (2019), Belmar (2020), Outakoski et al. (2018), and Mayeux (2024) demonstrate that digital spaces can support communication, learning, resource development, and community formation. The synthesis of the present study suggests that these benefits become more consequential for language maintenance when digital presence is connected with participation, actual language use, learning, and transmission.

Digital presence thus constitutes one foundational dimension of digital language maintenance, but it should not be interpreted as a mandatory first stage in a linear sequence. A language may possess extensive digital documentation while remaining weakly represented in everyday interaction, whereas another community may demonstrate active language practices despite limited technological resources. The significance of digital presence therefore depends partly on its relationship with other social and technological dimensions.

Based on the relationships identified across the thematic findings, the present study interprets digital language maintenance through five interrelated dimensions. This framework represents an author-developed synthesis rather than a pre-existing model reproduced from a single source.

Digital presence refers to the availability and representation of a language through texts, audio, video, documentation, social-media content, dictionaries, archives, and other digital materials. It establishes opportunities for a language to become visible and accessible in digital environments but does not by itself demonstrate continued language vitality.

Digital usability refers to the extent to which a language can function through orthographies, fonts, keyboards, applications, corpora, search systems, natural-language-processing technologies, and other technical infrastructure. This dimension is particularly relevant to the disparities in digital support identified by Simons et al. (2022) and to the challenges and possibilities of developing language technology for an under-resourced language described by Cunliffe et al. (2022).

Digital participation concerns the active involvement of speakers and learners in communication, interaction, content creation, resource sharing, and community activities. Belmar and Glass (2019), Belmar (2020), Mayeux (2024), and Hasugian et al. (2026) demonstrate in different contexts that digital environments can provide spaces in which users participate in linguistic and community practices rather than merely consume language content.

Language learning and transmission concerns the extent to which digital resources support the development of linguistic competence and contribute to the continued use and

transfer of a language. Outakoski et al. (2018), Li et al. (2021), Koole and Lewis (2018), Stone and Anonby (2019), Mayeux (2024), and Koole et al. (2023) illustrate different ways in which digital technologies can support language learning. From the perspective of language maintenance, however, learning becomes particularly significant when linguistic competence contributes to active use and, where possible, intergenerational transmission.

Institutional and community sustainability concerns the conditions that enable digital language-maintenance activities to continue over time. Meighan (2021) emphasises the importance of community-responsive technology, while Wise and Kostecky (2018) demonstrate the value of collaboration with the community responsible for language materials. Koole et al. (2023) incorporate the transfer of ownership and management into their technological design, and Galla et al. (2023) foreground Indigenous self-determination and community-centred language practices. These studies indicate that sustainability involves not only technical maintenance but also the capacity of communities to participate meaningfully in decisions concerning language resources and revitalisation activities.

The five dimensions should not be interpreted as sequential stages. Digital language maintenance may develop unevenly across them. A language may have extensive digital documentation but limited speaker participation, or an active community may maintain strong language-use practices despite restricted technological infrastructure. The framework therefore conceptualises digital language maintenance as an interconnected relationship among social, linguistic, technological, educational, and institutional conditions.

This interpretation also clarifies why technological sustainability cannot automatically be equated with linguistic sustainability. Digital platforms may lose users, applications may no longer receive technical support, websites may become inaccessible, and revitalisation initiatives may cease when institutional or financial support is discontinued. Conversely, maintaining a technological platform does not necessarily guarantee continued language use. Community ownership is therefore important because communities are not merely end users of technology; they can identify priorities, produce content, develop learning resources, preserve linguistic knowledge, manage digital resources, and connect online activities with language practices beyond digital platforms.

Based on the overall synthesis, language maintenance in the digital era can be understood as a form of adaptive continuity, in which languages continue to fulfil social and communicative functions while adapting to changing technological and communicative environments. Linguistic change itself should therefore not automatically be interpreted as language decline. Panjaitan and Patria (2024) demonstrate changes in linguistic forms associated with digital communication, while McKee et al. (2025) show that new-media use may be associated with genre development and stylistic variation in a minority language. Belmar and Glass (2019), Belmar (2020), Outakoski et al. (2018), and Mayeux (2024) illustrate how digital environments can create opportunities for communication, learning, and community formation. Simons et al. (2022), Cunliffe et al. (2022), and Meighan (2021), however, demonstrate that these opportunities remain shaped by technological inequality, resource availability, and community context.

Taken together, these findings indicate that adaptability contributes to language maintenance when linguistic change remains connected to social functions and actual language use. Digital language-maintenance strategies should therefore move beyond the production of dictionaries, applications, documentation, or online content alone. Their contribution becomes stronger when linguistic resources support communication, learning, participation, community ownership, and intergenerational transmission. In this sense, technology contributes to language maintenance when it becomes integrated into the broader social processes through which a language continues to be used, learned, adapted, and transmitted.

Conclusion

This study shows that linguistic transformation in digital spaces is reflected not only in changes in forms of communication, such as simplification, the use of nonstandard forms, language mixing, and multimodal communication, but also in the expansion of language-use domains. These changes do not necessarily indicate language decline. Language maintenance can continue as long as the language remains actively used, retains social functions, and continues to be learned and transmitted to subsequent generations.

The synthesis also reveals that language maintenance in the digital era is comprised of multiple interlinked strategies such as extending domains of language use into digital spheres, creation of virtual communities, development of documentation and linguistic resources, technology-based learning, and enhancement of language identity and prestige. These efforts, however, face a number of challenges such as dominance of majority languages, unequal technology support, limited corpora and learning materials, accessibility issues, sustainability of the programs and the gap between digital visibility and real use of the language in everyday life. Thus, the presence of a language within digital spaces cannot yet be regarded as a sign of successful language maintenance without the active use and transmission of the language across generations.

The findings of this study emphasize that digital language maintenance needs to be understood as an adaptive process that connects a language's presence in digital spaces with its actual use, community participation, learning, intergenerational transmission, and institutional support. This implies that language maintenance programs should not focus solely on content production or the digitization of language resources, but should also encourage the actual use of the language across various domains of life. Therefore, language technology development should involve speaker communities, expand access to learning resources and documentation, and receive support from families, educational institutions, and policies that enable sustained language use.

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