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Redefining the Concept of the Smart Library in the Context of Rural Spain: A Transliteracy Approach

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ABSTRACT

This article proposes a reconceptualization of the smart library through a transliteracy lens, exploring its transformative potential in rural contexts, the premise being that the best library is not the most modern but the one that serves its target community to the fullest. Moving beyond a merely technological understanding of 'smartness,' we argue for an expanded, inclusive notion that incorporates cultural relevance, educational equity, and collective engagement. Through the presentation of some case studies from rural Spain, we aim to show how the concept of transliteracy brings a novel perspective of smart libraries not only as digitally enhanced infrastructures but as dynamic, people-centred ecosystems capable of offering their users multidimensional literacies and fostering emotional and social ties between them in ways that are meaningful to them. Thus, we advocate the significance of 'smart' libraries in the transformation of rural areas as they are key to individual growth and community well-being, combatting displacement and the disappearance of cultural life. To this end, the adoption of a transliteracy approach is crucial, aiming to weigh the affordances of digital technology against other context-specific factors that contribute to the configuration of innovative and popular libraries in rural contexts, with

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literacy programs, book clubs, oral storytelling, exhibits, and other language-based initiatives that help weave together communal life and support the development of diverse 21st-century literacies.

Keywords: Smart Libraries; Smart Countryside; Transliteracy; Culture; Education; Languages; Language-Based Activities and Services

1. Introduction

Libraries play a vital role in preserving and promoting languages [1]. By archiving texts, oral histories, and recordings, they contribute to the safeguarding of endangered and minority languages [2]. Through the provision of multilingual materials and language learning resources, libraries support both native speakers and second language learners, fostering literacy and communication across linguistic groups. Language-based cultural programming, such as storytelling sessions, author talks, and other events (within the context, for example, of foreign celebrations), further strengthens pride in linguistic heritage. Libraries also connect people with the digital tools and online platforms essential for documenting and reviving languages. Because they are welcoming, community-oriented spaces, libraries are instrumental in helping languages not only to persist but to truly flourish in our increasingly connected world.

Apart from offering repositories of foreign books, textbooks, and various materials to users who wish to learn or practice a given language and access its culture, libraries help their linguistically heterogeneous user community by bridging language barriers [3]. It should be noted that the role of libraries in relation to the promotion of languages varies considerably depending on the relevance of the specific language in question. Among the expert studies on the impact of the linguistic services offered by libraries, Serra & Revez [4] highlight how public libraries in Portugal, despite limited resources, support social inclusion for refugees and asylum seekers through free internet, language resources, and digital literacy. Serrano Pérez & Faba-Pérez [5] also explain how some Spanish public libraries play a crucial role in integrating migrant communities by providing practical guidelines for inclusive services.

In the last decades, the term *smart library* has been used to describe a library that has automated many of its traditional functions thanks to technology, such as classifying books and other objects in computational databases, imple-menting the use of barcodes to identify books, incorporating self-checkout systems and automated book returns, turnstiles to give access to legitimate users, etc., a list of functionalities that can save time and human resources [6]. In this sense, not only is the concept of smart library associated with streamlining library operations, but it has also been used to refer to the expansion of the physical library into cyberspace to create a virtual library through which users can gain access to its collection data, peruse digitized items, and create their own personalized environment. Smart libraries have already been studied as essential spaces that can contribute to the construction of smart cities [7]. This article re-examines the idea of 'smart libraries' from the viewpoint of rural areas. We want to show how these libraries can be key in transforming their local regions, becoming solid foundations for individual advancement and community strength, while also pushing back against people leaving and the decline of cultural traditions. Smart libraries nurture basic human rights. They do this by making sure everyone has fair access to languages, information, knowledge, and cultural expressions. They also support ongoing learning, defend free speech, and offer free, inclusive places where people can grow and play a full part in society. This is arguably a context-dependent consideration. The present article seeks to rethink today's conceptual space of smart libraries for the development of smart rural towns and villages as part of a transversal knowledge society.

1.1. From Printed Libraries to Digital Libraries

Like any human construct, modern libraries reflect the society they serve. Three major types of libraries can be distinguished: firstly, public libraries, which are repositories of selected, catalogued, and updated books and other materials. Some of them are remarkably vast, like the Library of Congress in Washington, D.C., with over 170 million items in more than 470 languages (including books, recordings, photographs, maps, manuscripts, etc.). It is not just a library

for the Congress, but a research library open to the public and a treasure trove of knowledge. The social role of public libraries is also reflected in their various services and programs for community participation. Secondly, academic libraries, each of which belongs to a higher education institution. They support instruction by giving access to texts related to academic curricula and the various research fields covered in the different centres. Like public libraries, academic libraries act as levelling agents as they provide free and equal access to information, knowledge, and resources. Their social role is also reflected in their cultural service departments, which are constantly organising activities for the promotion of culture and knowledge, such as exhibitions and academic events. Thirdly, school libraries that are specifically for pre-school, primary, and secondary education. They form part of specific educational centres to support their curriculum. School libraries usually have a major line of activity dedicated to learning and promoting reading, and often even developing a reading habit. There are also special libraries for professional and special interest groups (in corporations, administrations, etc.). Their libraries provide them with customized resources and services that are oriented to cover their specific needs for professional advice and expert consultation. There are also private libraries, which can be as large as public libraries but belong to a private individual or small group (e.g., clubs) and are generally focused on their owner's profile [8].

Traditional printed libraries have long been key to broadening access to language learning, boosting literacy in first and other languages, and helping multilingual communities thrive. For years, they've given free access to diverse materials like books, dictionaries, grammar aids, newspapers, and literature in various languages. This allows people to pick up new languages, keep heritage languages strong, and find resources for school or personal study. Libraries serve as vital hubs for early literacy initiatives in primary and secondary languages, helping establish the core reading and understanding skills needed for further language development. In formal schooling, they provide extra support for language students through textbooks, bilingual materials, test prep resources (like TOEFL, DELE), and guides for grammar, vocabulary, and writing. By assembling collections in many languages (such as Spanish, Catalan, English, and Arabic), these institutions introduce users to different cultural backgrounds, fostering cross-cultural insight and ef-

fective communication. Additionally, in rural spots or areas with minority languages, like the Basque or Galician regions in Spain, print libraries have been crucial for protecting local tongues by offering native-language literature, language groups, and dialect archives.

In the second half of the 20th century, the first digital library was launched, the Project Gutenberg, which pioneered the concept of digitally archiving books for free public access long before the Internet was widespread. Today, more than half a century later, this library hosts over 60,000 free e-books, multimedia collections, etc., including many public domain classics. More importantly, digital libraries have proliferated to make texts freely or easily available in digital format to the public and thus improve access, preservation, and dissemination of knowledge [9]. Access can be direct or remote 24/7 from anywhere in the world. Fragile, rare, or endangered documents (e.g., old manuscripts) can be protected against loss due to decay or disaster. Together with the digitalization process of the contents, advanced research tools enable full-text indexing, cross-referencing, advanced consultation, and immediate distribution in multiple languages.

Digital libraries promote collaboration between knowledge institutions (including libraries, universities, and museums) and their shared repositories are sustainable in that their duplication is redundant, hence reduced. The need for physical storage and maintenance, updating, and dissemination costs is drastically reduced, too. Last but not least, beyond issues of cost and resource efficiency, the whole language learning/knowledge acquisition experience is enhanced: text can be combined with images, audio, video, and interactive elements, which helps maintain attention, motivation, and engagement, and makes learning more dynamic, appealing, and enjoyable for more users. Interactive simulations and gamified elements, for example, allow users to move away from passive learning into active exploration, participative processing, and critical thinking. Multimedia contents (such as virtual labs and 3D models) help clarify complex conceptual areas and complement theorical underpinnings with practical understanding in real contexts of usage. Also, many online platforms provide instant feedback and assessment through quizzes and autograded tasks, which benefits both learners and teachers to track progress and adjust strategies in basically real time. Furthermore, digital materials support diverse learning styles and accessibility needs. Language

student users can benefit from the range of multimedia formats to match their visual, auditory, kinesthetic, etc., profiles, while they learn at their own pace and revisit materials as they deem necessary. Language barriers and disabilities are dealt with through such techniques as subtitling, screen readers, and translation systems. Although significant challenges remain, digital libraries are increasingly designed with accessibility in mind.

1.2. Smart Libraries for Smart Cities

Smart cities use digital technology and data insights to make urban living better by making services run more smoothly, promoting sustainability, and improving life for those who live there. Cocchia[10] defines a smart city as one that integrates information and communication technology to boost the quality and performance of city services, intending to lower resource use and overall costs. Key aspects defining smart cities involve efficient use of resources, making decisions based on data, and improved mobility. Other aspects of smart cities that are more directly relevant to libraries in their inherent goal to preserve our cultural heritage, provide information and knowledge, and support education and learning include their capacity to offer enhanced public

services. Meijer & Bolívar[11] note specifically that "citizen-centric digital platforms enable participatory governance and empower *urban* communities" [*our emphasis*]. The enhancement provided by such platforms (and their associated tools) is bidirectional in the sense that public participation is encouraged through mobile apps and digital forums, fostering transparent and collaborative governance.

The smart library is a powerful concept generally associated with that of the smart city, with which it shares important characteristics, such as "the focus on information and the multidimensionality of the concept"[12]. Schöpfel explains that smart libraries are built around four main dimensions: smart services, smart users, smart spaces, and smart governance. Rather than a single model, they represent an ongoing process of innovation. Indeed, smart libraries are characterised by the use of modern digital tools to improve how people access knowledge, services, and community spaces. Like smart cities, smart libraries focus on being efficient, interconnected, and people-centred. Thus, the concept of a smart library is qualitatively higher than that of a digital library. The former extends beyond digital access, incorporating user behaviour, location data, and intelligent systems to offer adaptive, real-time services (see **Table 1**).

Table 1. A contrastive analysis between digital libraries and smart libraries.

Aspect	Digital Library	Smart Library
Definition	A collection of digital content (e.g., e-books, journals, media) accessible online.	A tech-enabled, user-focused space that integrates AI, IoT, and data to offer personalized and intelligent services.
Focus	Access to digital resources.	Improving user experience, services, and operations using real-time data and automation.
Technology used	Basic ICT tools like databases, content servers, and search engines.	Advanced technologies like AI, IoT, cloud computing, big data analytics, and smart infrastructure.
User interaction	Users search and download resources, usually passively.	Interactive systems personalize services, assist users in real time, and engage communities.
Services offered	Digital reading, media downloads, online catalogs.	Personalized recommendations, real-time service updates, makerspaces, self-service kiosks, etc.
Role in community	Mainly a digital resource provider.	Acts as a knowledge hub and community center, promoting learning, innovation, and civic engagement.

A smart library is about using intelligent systems and user-centred design to deliver adaptive services and support smart city goals. Among the most notable smart libraries around the world that illustrate how libraries are evolving within smart city ecosystems by leveraging technology, enhancing access, and promoting civic innovation, Singapore's National Library exemplifies smart infrastructure and digital integration within a highly connected smart city. In fact, it acts as a civic and innovation hub aligned

with Singapore's 'Smart Nation' initiative, integrated with e-government services, serving as a tech-enabled knowledge centre, and supporting digital citizenship and innovation (https://www.smartnation.gov.sg/). In Europe, the Dokk1 Library (Aarhus, Denmark) is one of the most advanced public libraries, integrating smart technologies with participatory governance, aligning this facility with smart city goals (https://www.dokk1.dk/english). In Australia, the State Library of Queensland (Brisbane) offers a model of

adaptive, user-centred smart library design, featuring digital storytelling labs, interactive exhibitions, and AI-assisted services. Thus, it supports inclusive digital literacy and fosters innovation for all age groups (https://www.slq.qld.gov.au/). In America, the Toronto Public Library (Canada) has embraced smart tools for equitable access and lifelong learning (e.g., with coding classes and digital media labs), thus striving to bridge the digital divide by providing free access to emerging technologies and training (https://www.toronto.ca/city-government/accountability-operations-customer-service/city-administration/city-managers-office/agencies-corporations/agencies/toronto-public-library/).

All around the world, digital libraries are powerful tools for language access, education, and preservation. They support both formal language learning and broader multilingual literacy, making them essential to inclusive, global knowledge societies. Digital libraries offer cross-lingual retrieval, since users can search in one language and find resources in others, breaking language barriers and supporting language learners worldwide. Conversely, they can also support translation tools and universal dictionaries, enabling users to read, search, and learn in multiple languages, even when the original resources are not in their native language. Some digital libraries include built-in language learning environments, offering interactive exercises, reading comprehension tools, and vocabulary development activities generated directly from library texts[13]. Regarding minority and endangered languages, they help preserve endangered languages by making multilingual documents accessible and allowing community-driven localization efforts, and also serve as archives for minority language materials. Barker and Di Mauro[14] note that initiatives like bilingual digital e-readers for home use have been shown to increase family engagement in language learning, particularly among refugee and multilingual students.

As has been seen, the affordances of smart libraries include their contribution to urban innovation since they play the role of vital knowledge hubs that can help gather and use data for smarter city planning and services, including language-based services. However, as much as 97% of the land surface is non-urban, and demographic data state that 44% of the world's population does not live in urban areas[15]. In Spain, 90% of the population is concentrated in only 30% of the territory, 61% of Spanish towns have less than 1000 inhabitants, and 19 out of the 50 Spanish provinces are among the least dense in Europe[16]. The question remains, therefore, whether smart libraries are inherently linked to smart cities only.

2. Method and Evidence

The methodological approach employed in the research presented in this article is of a theoretical nature, aimed at establishing the basis of a conceptual model for smart libraries in rural contexts, emphasizing the prominent role that transliteracy plays within them. Such a complex research goal cannot rely on a single empirical experiment; rather, it requires the articulation of conceptual areas and their interrelationships, as they have emerged from a diverse set of prior initiatives and interventions, both scholarly and applied, many of which have had an experimental character.

The research design adopted is informed by Ravitch & Riggan's[17] protocol for conceptual model construction. This involves defining and characterizing the research problem through an in-depth literature review, identifying relevant concepts, and mapping the relationships between them. Two remarks are to be made about the design of the proposed model. Firstly, the evidence base for the model consists of both a critical synthesis of selected literature, mostly of a qualitative nature, and recent firsthand empirical research work undertaken by the authors and the rest of the ATLAS research team (https://www.uned.es/universidad/inicio/investigacion/Institutos-centros-grupos-investigacion/grupos-investigacion/applying-technology-to-languages.html?idContenido=1) in the context of the AGORA project (https://www.agora-atlas.es/), carried out between mid-2023 and early 2025. The AGORA initiative comprises a series of decentralized, relatively short quasi-experiments or micro-projects implemented in real-world rural institutions, such as municipal, school, and museum libraries. These micro-projects emerged from a prior needs assessment conducted in 2022–2023 to identify the demands of social agents involved in language-based services, including education and tangible and intangible heritage preservation, across three rural regions in inland Spain: Bajo Aragón (northeast), El Bierzo (northwest), and La Loma (south). This distributed research effort employed a mixed-method approach, combining qualitative and quantitative techniques, and adhered

to the principles of Participatory Action Research: it was collaborative (involving participants as co-researchers), iterative (following cycles of planning, action, observation, and reflection), and deeply contextual (anchored in real-world, lived experiences).

Through this lens, the research presented here does not merely compile findings but engages, firstly, in the original profiling of a conceptual area and, secondly, in conceptual modeling, drawing conclusions about the effectiveness, challenges, and broader implications of transliteracy-related practices in the language services of libraries across different rural environments. Thus, the study also takes a meta-analytical perspective, analyzing a considerable range of previous studies and project outcomes to identify recurring patterns, conceptual gaps, and design consistencies relevant to the configuration of *smart rural libraries*. It is to be emphasized that this research involves an observational component of a qualitative nature, analysing real-world examples of successful rural library projects. This type of approach is common in fields like the humanities and social sciences, where the main goal is to understand the full context and interpret what is observed. The second methodological remark is that the AGORA project's setup, both transversal and longitudinal, provides a solid platform for both refining the conceptual model that is being used and validating it.

As described on the project's website, the microprojects into which it is divided have been carried out jointly by members of the ATLAS research team and co-researchers in rural communities working in libraries, museums, and educational centers, all following the principles of Participatory Action Research[18]. These collaborations are expected to provide essential feedback for refining and updating this initial model.

Finally, this work critiques some existing practices and reflects upon the implication of a specific conceptual direction, strongly advocating for the integration of transliteracy as a multidimensional competence necessary for inclusive and participatory societies. This is particularly vital in rural regions with rich linguistic heritage, yet facing demographic decline, infrastructural limitations, and budgetary constraints, alongside increasing demands for training, knowledge-sharing, and communication capacities comparable in many ways to those in urban environments. This combination of theoretical development, cross-analysis, observational insight, and critical reflection aims to make this study a robust contribution to the evolving understanding of language and literacy in educational and cultural services in under-resourced rural regions.

Contextual and Linguistic Profile of the Setting: The Case of Rural Spain

The specificity of rural life with respect to urban life lies in its contrasting territories, lifestyles, economic activities, social structures, access to services, people's imaginaries, and, last but not least, a rich, diverse, and legendary linguistic profile to protect, alongside the same demands for language competence dictated by progress everywhere. To begin with, demographic density in rural territories is low, which has mixed consequences. On the one hand, with fewer people spread across large areas, there is a limited choice of services and facilities because of the difficulty in attracting investment to quantitatively low demand and spending. On the other hand, there is a stronger sense of community and familiarity, and inter-institutional collaboration is frequent and administratively straightforward. The relationship between rural residence and isolation is complex, with studies showing mixed results depending on context, age group, and socioeconomic conditions[19,20]. However, while in rural areas there is reduced access to social support systems, there are stronger community ties and reduced anonymity, stronger interpersonal bonds and reduced alienation, all due to a combination of social, psychological, and structural factors which undermine their sense of belonging, control, and connection[21]. Other aspects that conform to rurality include the slower pace and simpler lifestyle in comparison to urbanity, which also entails mixed consequences. On the one hand, this vital rhythm may cause a feeling of restriction or stagnation, particularly in the young population, typically eager to be exposed to constant stimulation and innovation. On the other hand, a rural lifestyle is prone to mental well-being and leaves time for introspection and un-purposed, self-determined leisure activities. Such activities are the consequence of a non-competitive mentality and a closer connection to nature in terms of physical proximity, daily dependence, and personal choice. Furthermore, cultural traditions, values, and practices, and intergenerational knowledge play a significant role in rural environments because they represent people's collective memory, history, and identity. Conversely, urban communities are often fragmented

and somewhat diluted due to their demographic heterogeneity and constant population turnover, as well as a strong latent inclination towards progress, modernity, innovation, and consumerism.

Apart from the rural-urban divide, popular imagery is an aspect that deserves special attention in that it plays a determining role in shaping how people from different countries perceive rural life, and these perceptions can differ widely depending on their respective cultural, historical, etc., idiosyncrasies. These self-images often consolidate national identities, influencing public attitudes and even government policies. If we take into consideration Western European countries, for instance, France's strong cultural connection with its rural heritage stems from a complex blend of history, tourism development, and political ideology. Even in the face of national standardization through institutions like schools, French rural communities often maintain distinct cultural practices, emphasizing local identity in subtle opposition to urban norms. Several academic studies highlight how this rural rapport has evolved and been actively cultivated and disseminated beyond its borders [22,23]. The United Kingdom's popular imagery of rural life is overwhelmingly positive, too. Its portrayal is informed by nostalgia and national symbolism, frequently idealizing rural life while overlooking the persisting social and economic challenges faced in this environment [24]. Historically, the British urban-rural dichotomy has positioned the city as messy and anonymous. The countryside, however, was painted as steady, community-focused, and calm. This opposition has cemented that romantic, almost idealized, view of England's rural life, a picture constantly retold through media and popular culture

While countries like France capitalize on rural authenticity, craftsmanship, and gastronomy, managing to turn rural life into a profitable cultural economy, and others like the United Kingdom frame rural life as nostalgic, wholesome, and noble, fostering aesthetic superiority and charm, and emotional and moral appeal, the case of rural Spain is radically different. Spanish rural imagery is often negative because of prevailing historical associations with poverty, cultural marginalization, and social injustice. Contemporary discourse frequently frames rural Spain through narratives of decline and abandonment, despite increasing efforts to promote more balanced and empowering perspectives. Occupying over 85% of the national territory yet housing

15,9% of the population, rural Spain embodies both cultural richness and untapped potential [25]. However, it simultaneously confronts profound structural challenges, including demographic aging, sustained depopulation, and significant economic vulnerability. Although ecotourism is growing, today's rural Spain is still dominated by the primary sector. Outside of farming and tourism, economic opportunities are rather scarce, leading to dependency and underemployment. One of the most striking aspects that holds the attention of society and the media is that of depopulation (a situation that is referred to with the politically tinted term: 'España vaciada' [trans. 'emptied Spain']). Many rural areas are experiencing population decline and imbalance, with young people moving to cities for jobs, education, and a more promising future, a high proportion of elderly rural residents, and male-dominated villages due to high young female rural exodus [26].

The linguistic profile of rural Spain starkly underscores the nation's deep-seated multilingual character; equally, it brings to the fore specific, often acute, challenges concerning library services, education, and efforts towards language preservation. While Spain officially recognizes four languages (Castilian Spanish, Catalan/Valencian, Galician, and Basque), it is precisely in the countryside of Catalonia, Galicia, the Basque Country, and parts of Valencia and Navarre where these other languages are not just present, but actively part of daily life alongside Spanish. However, particularly in areas affected by depopulation, younger generations are increasingly shifting to dominant urban or national languages, placing local dialects and minority languages at risk. This trend is exacerbated by rural emigration, which weakens the intergenerational transmission of these languages [27]. In line with the broader European commitment to plurilingualism (especially the '2+1' language goal established in Barcelona in 2002 by the European Union; https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=legissum%3Aef0003), institutions have a responsibility to offer multilingual materials and resources, as well as teacher periodical language training to combat both fossilization and attrition due to lack of practice opportunities. Three additional factors must also be taken into account. First, some rural regions now host migrant communities, increasing the demand for language inclusion programs, such as Spanish as a second language. Second, there is a need to access books, educational resources, and

digital content in Spanish, regional languages, major foreign languages, and increasingly, immigrant languages. Third, together with centers to obtain information and training on languages, there is also a need for spaces for intergenerational transmission, capable of supporting activities such as oral storytelling, cultural workshops, and multilingual reading groups, all of which reinforce intangible heritage and community development.

Nonetheless, the realization of this vision faces serious constraints, including geographic dispersion, small and aging populations, vulnerable groups, and infrastructural limitations, all of which demand context-sensitive and innovative solutions. Two related considerations emerge at this point. Firstly, the potential of rural library systems as multilingual centers that are truly responsive to their communities. These places could then make a real impact on keeping languages alive, sustaining linguistic diversity, and promoting literacy for all, while equipping people with the linguistic competence standards of the knowledge society. Secondly, the idea that a vital component for achieving this potential is to adopt transliteracy methods, i.e., approaches that combine oral, print, and digital literacies in meaningful and context-sensitive ways.

3. The Role of Libraries and the Transliteracy Approach in the Linguistic Empowerment of Rural Areas

Rural libraries in Spain differ significantly from their urban counterparts in both function and impact. They are multifunctional spaces that help preserve identity and support local life in ways that urban libraries often do not need to. To begin with, they serve as the primary public space in small communities. They are more than just places for books: they try to act as cultural centres, meeting points, and support hubs, especially in areas where other public services are scarce. With fewer users, library staff often build strong personal relationships with them and are ready to offer tailored services and a highly sought-after interpersonal rapport. These libraries also strive to play a key role in bridging the digital cum territorial divide by offering internet access and digital literacy training to nearby inhabitants with limited connectivity. They are essential in geographically isolated areas, sometimes offering mobile services to reach those without transport. Despite their modest budgets and staff, rural libraries often display remarkable creativity, forming partnerships to expand their reach. Conversely, since many rural communities lack other institutions, libraries often step in to host town meetings, provide social services, and support basic needs. Regarding the educational mission of rural libraries, they sometimes collaborate with political and academic institutions to offer their premises for customized training to fit local needs, particularly those related to lifelong learning, well-being, cultural heritage, and languages[28]. This is acknowledged in the *Educación y Biblioteca* (2005) journal (trans. 'Education and Library'; https://gredos.usal.es/handle/10366/102624). A common concern is serving the interests and needs of vulnerable groups (e.g., elderly people, people with disabilities, people in marginalized situations, displaced people) as a contribution towards inclusion or integration (e.g., basic Spanish notions for migrants and English for housewives and retirees). To this end, rural libraries organise *ad hoc* training sessions and acquire relevant collections and study and reading materials, ensuring their accessibility and collaborating with other entities or political authorities to optimize initiatives.

Rural libraries can provide the very language services and functionalities identified in the previous section as both necessary and potentially problematic in these communities. These libraries can play a key role in supporting, preserving, and enhancing languages, especially in locations that are rich with different tongues but often short on resources. They achieve this by, for instance, digitizing collections of unique regional and endangered languages, carefully archiving oral histories, local dialects, and traditional stories, and backing innovative projects that document language in many forms. Beyond that, rural libraries are placed to really push multilingual literacy forward. They can stock books and learning aids in a whole host of languages, including those brought by new communities and the heritage tongues people want to keep alive. To properly serve everyone (taking into account how different people learn, what they prefer, and what they can access), these materials need to come in all sorts of formats.

The elderly constitute a particularly vulnerable group when it comes to technology-based services, which can have an impact on the digital and generational divides. As for

the former, libraries can enable skill-building opportunities by offering language access through technology, providing their users with digital tools and platforms (e-books, translation apps, language-learning software) and resources that effectively integrate oral, print, and digital literacies, in order to support users with varying levels of digital literacy in progressively accessing more complex and sophisticated resources. Regarding the latter, libraries have the potential to foster intergenerational transmission through language-based initiatives, where, for example, elders contribute storytelling, songs, and traditional narratives, which younger participants can record, reinterpret, repurpose, and remake in interactive linguistic workshops aimed at the preservation of traditional linguistic and literary heritage. This is only one of the vulnerable social groups that can be supported by libraries' free customized language services and resources (e.g., Internet access, mobile-assisted language learning apps, translation tools), acting as community hubs for the linguistic integration of people. Regarding rural language learning, schools and other institutions often just do not have enough materials or trained teachers in the target languages, largely due to tight budgets. However, libraries can really step up to help with books in many languages, tools for learning languages, and supporting dual-language programs. This is where technology has some real advantages: it is not only that it can store an ever-growing collection of materials, but it is also useful for education itself, giving learners a broad choice of resources and formats, which makes for language learning that is more interactive, suited to the individual, and easier to access.

These examples of language-related services offer insight into the role that multimodality and transliteracy play in enhancing the effectiveness of language services in rural libraries. While multimodality refers to the use of multiple modes (e.g., text, image, sound) to construct meaning, transliteracy goes further by focusing on the user's ability to navigate, interpret, and produce content across a range of platforms and media—oral, print, and digital. In the context of rural smart libraries, transliteracy offers a more comprehensive and practical dimension, as it addresses not just communication formats but also digital inclusion, multilingual literacy, and user empowerment. Unlike multimodality, transliteracy emphasizes real-world skills and access, making it especially relevant for bridging rural divides and fostering inclusive, community-centered library services. Therefore, the authors claim that the standard concept of the smart library, as covered in subsection 1.2, can be revisited through a transliteracy approach, aiming to weigh digital technology against other factors that contribute to the configuration of both innovative and popular libraries in rural contexts, with literacy programs, book clubs, oral storytelling, exhibits, and other community-based initiatives that help weave together communal life while supporting the development of diverse 21st-century literacies. These libraries are neuralgic spaces where technology is expected to be at the service of communal human values and circumstances. To illustrate this strategic integration, what follows is an analysis of real case studies as successful language-based initiatives that have been implemented in Spain's most depopulated rural regions, to enhance the life of their respective communities through smart libraries of their own making.

To start with, let us briefly explain what we mean by using a transliteracy approach in the context of the adaptation of smart rural libraries to their cultural, informative, and educational mission. The concept of transliteracy emerged from the interdisciplinary Transliteracies Project (https://liu.english.ucsb.edu/transliteracies-research-in-the-technological-social-and-cultural-practices-of-online-reading/), led by Alan Liu from the University of California, which was primarily focused on the nature of online reading. In 2005, Sue Thomas, a professor of New Media at De Montfort University, attended a conference organized by Liu's research team. Since that time, she has built upon their research, playing a significant role in shaping the core concepts and the working definition of transliteracy. The actual term 'transliteracy' has its roots in 'transliterate': the process of taking words or letters from one alphabet and finding the closest matches in another. As Tom Ipri, who heads Media and Computer Services at the University of Nevada, points out, transliteracy, at its heart, is about being able to understand and communicate meaning through a whole variety of media formats. The main thrust here is the interconnectedness of all these different kinds of literacies (textual, visual, digital, etc.), instead of seeing them as separate skills[29]. Thomas and her colleagues defined transliteracy as "the ability to read, write, and interact across a range of platforms, tools, and media from signing and orality through handwriting, print, TV, radio and film, to digital social networks"[30]. This

perspective, therefore, implicitly acknowledges that reading happens through a multiplicity of media and allows the incorporation of different types of literacy in initiatives aimed at its promotion. Moreover, a transliteracy perspective implies several reconfigurations in the construction of knowledge. By emphasizing the social uses of technology in general and not focusing on digital technology in particular, it allows the integration of past technologies (and techniques) with new ones, including a decentering of print versus other types of media, and therefore, recuperating the cohesive power of performative art forms and oral narration. This decentering comes along with the transformation of other established hierarchies, inviting non-experts to contribute to knowledge construction with their own life experiences and cultural acumen, and promoting intergenerational exchanges. Transliteracy also calls for an understanding of literacy on the move, across media, but also addressing the mobility of people, devices, and technologies.

As shown in **Figure 1**, a key distinction between the digital library and the smart library lies in the latter's emphasis on community building—acting as a hub for knowledge, interaction, and civic engagement. From a computer science perspective, the term *smart* typically implies the integration of advanced technologies (such as artificial intelligence, the Internet of Things, cloud computing, or big data analytics) into library infrastructures to enhance user interaction with services. The authors, however, propose a different type of smartness. First, one that emerges from the specific conditions of rural libraries, shaped by limited funding and resources, and sustained by the ingenuity and goodwill of librarians, teachers, and other stakeholders working to overcome contextual challenges. Second, a smartness not defined by access to cutting-edge technologies, but by the multimodal affordances offered to users and their capacity to navigate across formats, platforms, and situations—suggesting that transliteracy may be both the strategy and the standard by which such adaptive resilience is realized.

Analysis of Case Studies on Transliteracy in Rural Libraries

"Libraries resemble their communities: the communities' interests are their own."[31]. This powerful claim underscores the supporting role of libraries, focusing on channelling and promoting local language-related contents and activities (e.g., cultural-historical visits, festivities), which

have an impact on residents' subjective self-perception and well-being and strengthen their sense of community. Libraries can foster different forms of artistic creation around language and serve as venues for initiatives in a wide range of formats, such as literary competitions, poetry contests, and thematic series of various types. They are dissemination agents of all types of strategic campaigns targeting their respective publics. In particular, they are key in individual and collective reading promotion activities (from storytelling and puppet shows for the youngest to conferences, courses, screenings, and exhibitions for the general public), usually with low budgets and high dedication. Examples include the 'Maratón de los Cuentos' (trans. 'Storytelling Marathon'; https://www.maratondeloscuentos.org/en/) in Guadalajara (central Spain), an annual event where storytellers from around the world narrate tales continuously, celebrating oral tradition and attracting both locals and visitors. Also, the Fundación Cerezales Antonino y Cinia in León (trans. Cerezales Antonino and Cinia Foundation) (in the northwest) organizes ArtTítere (https://fundacioncerezalesantoninoycinia.org/en/?s=art+titere), a festival dedicated to puppet and object theater, and also hosts film screenings and various cultural activities, serving as a hub for artistic expression in the rural area of Cerezales del Condado (with 70 inhabitants). In Alcañiz, the capital of the Bajo Aragón region (northeast), known for its humanistic tradition since the 16th century, a language-based initiative is the oral narrative event 'Cuentos en la noche' (trans. 'Stories in the night'; https://www.uned.es/universidad/inicio/unidad/ihupa/festivales-de-narrativa-oral.html), held annually in the open-air amphitheatre on the hillside below the Castle of the Order of Calatrava, which crowns the town. This festival is organized every summer by the UNED-Alcañiz University Institute for Humanities and Heritage (IHUPA), which is also responsible for recording the thematic sessions, later archived and preserved by the municipal library. As can be seen, some of these initiatives are shared with urban libraries and other countries, like the 'Human Library' (https://humanlibrary.org/), created in Denmark in 2000 as a response to hate crime, which consists of inviting 'books' to tell their story, where the book is a volunteer who shares their lived experience orally in order to challenge stereotypes and encourage open conversation.

Film screening in libraries, despite being modest in

scale, contributes to local pride, intergenerational interaction, and creative expression, especially in depopulated areas[32]. In Catalonia (northeast of Spain), the Filmoteca de Catalunya (trans. Catalonia Film Archive) has established the FilmoXarxa network (https://www.filmoteca.cat/web/en/node/139) to promote film culture across the region. This type of activity often involves collaboration with rural libraries to facilitate cinematic events in smaller communities, sometimes as part of a wider dual activity involving book reading. In the above-mentioned town of Alcañiz, there is strong multidirectional collaboration between municipal public management, including its library, and local private initiatives led by residents. This collaboration ensures that official cultural institutions not only reach the broader population but also benefit local businesses, such as restaurants and accommodation providers. An example takes place in the Liceo, located in the historic center, which, in collaboration with the library, hosts a weekly cultural event, typically consisting of a film screening followed by a colloquium (e.g., on topics such as the local *chapurriau* dialect; https://www.lacomarca.net/lleno-liceo-alcaniz-proyeccion-documentales-chapurriau/) and a thematically linked dinner. This initiative aims to combine gastronomy and culture as a way to strengthen community bonds.

Library buses (in Spanish: 'bibliobuses'; https://bibliobuses.com/) continue to be essential in rural areas lacking a permanent brick-and-mortar library building. Their adoption of digital technology has enhanced their services, as the modernization project of León's library buses serves to illustrate, which now allows users to reserve or order new books with their mobile phones or geolocate the bus in real time (in 2023, this service reached 393 small towns, catering to 119,572 inhabitants with 111,694 loans and travelling 107,689 kilometres)[33]. But library buses not only bring books closer to a dispersed community but also use their advantageous position as a mobile institution to establish a deep, lasting, and meaningful connection with the rural region's inhabitants. This is achieved through a myriad of activities to promote reading and culture, including storytelling, magic shows, science and technology workshops, contests, and even small exhibits inside the buses. These activities are mainly aimed at raising awareness of the need to preserve the region's intangible heritage: oral traditions, knowledge about the local natural habitat, artisanal techniques, etc. El Bierzo's library buses, in conjunction with the A plena Cultura association, have contributed to the cohesion of the community by organizing hybrid book clubs (both face-to-face and online) in order to engage readers from different towns, villages, and beyond. Moreover, as Roberto Soto, head of the Libraries Coordination Section of the León Provincial Council, recounts, these buses also reach nursing homes and the prison in Mansilla de las Mulas (León). This centre has a respect module whose inmates are entitled to order reading books from the library bus service, beyond the heterogeneous repository of books mostly donated by departing inmates, thus being reminded that their personal needs and requests do count for the institutional authorities and society. This is part of a new experience that is currently being developed in Spanish correctional facilities to redesign the traditional concept of prison as a mere place of confinement, by providing opportunities of enhancing and expanding the social and personal resources of its inmates (Spanish Home Office, 2007, *Módulo de respeto: módulos penitenciarios para la mejora de la convivencia* [trans. Respect module: prison modules for improving communal living]. Today, the library bus is expanding its services online thanks to its webpage, Facebook account, and app. The app can be used to consult the library's catalogue, make reservations, check the buses' visits on a calendar and its itinerary in real time. Moreover, this can also be used to expand what the books themselves can do through QR codes inside each book, ready to take the reader off to related videos, podcasts, films, maybe even the author reading their own work. El Bierzo is a rural place, one of Spain's most depopulated regions, and its character is shaped just as much by the land itself as by the inhabitants. This region has certainly faced its difficulties; in them libraries have demonstrated to be key in keeping community connections alive and offering everyone there cultural and educational opportunities.

Progressing from the most unpopulated areas towards the main towns, what follows is some of the main initiatives that are currently being implemented to revitalize this region. A Plena Cultura (lit. trans. 'Full Access to Culture'; https://aplenacultura.org/) is a cultural association formed by volunteers and coordinated by Santiago Asenjo, the former director of the Library of the University of León (ULE), which has a very active and inspiring role in the cultural life of the eminently rural region of El Bierzo. Its initiatives in-

clude communally restoring buildings to transform them into self-governed libraries and organising periodical language-based activities like poetry recitals in natural settings by acclaimed writers, with iconic elements like a cherished natural lectern referred to as *'piedra del poeta'* (trans. 'poet's stone'; https://www.fundos.es/a-plena-cultura-present a-en-casa-botines-la-biblioteca-de-poesia-y-poetas-y-l a-ruta-virtual-de-poetas-bajo-el-hayedo-de-busmayor/). Moreover, the association recycles traditional beehives called *truébanos* (trans. 'hollow log hives'; https://aplenacultur a.org/libros-libres-minibibliotecas/) as tiny evocative libraries and disperses them through the villages and forests of the region with books inside meant to be exchanged by residents and visitors. Interestingly, despite the lack of supervision, they have never been vandalized or misused. Another forthcoming project to connect culture and knowledge with community and nature consists of the use of augmented reality to instill poetry in El Bierzo's natural settings, where the woods become much more than a backdrop. It will be a virtual tour that allows visitors to listen to poets' voices thanks to QR codes scattered throughout the forest mass, which can be read from any mobile device [34]. As Asenjo explains, many of these initiatives can be replicated in rural towns, specifically in their empty buildings, once schools or school master homes that were once forced to close and then abandoned due to the lack of children [33]. The digital extension of this cultural association, which includes a webpage and a lively social network on Instagram, also provides essential information about the processes and alliances that are being woven to fulfil their projects, so that they can be joined or imitated elsewhere.

Other initiatives in this region include the Official Language School (EOI) library in Ponferrada (http://eoipon ferrada.centros.educa.jcyl.es/sitio/index.cgi?wid_seccio n=45&wid_item=134), the capital town of El Bierzo, with around 60,000 inhabitants (2024). With about 2000 book loans each year, it has become a major resource centre whose main purpose is to promote language learning through reading. The EOI offers courses in German, French, English, Portuguese, Italian, and Galician, and different activities are launched to promote the library and its collection of reading materials organised according to the language and difficulty level. Each year the library sets up a book fair with the slogan: 'Each book has two authors: the writer and the reader,' which

is prepared throughout the academic year. At the beginning of the course, students are invited to select a book from the recommendations list and prepare a dramatized speech in the language they are learning (to be recorded), as if they were the author or one of the characters, to recommend the work to other potential readers. During the book fair, students will be invited to participate with their dramatized readings in the EOI show, encouraging in this manner the opening of the different classes' activities to the whole intergenerational community of the EOI. Literature is also intrinsically tied to language learning in other activities entitled 'Reading and travelling' and 'Author of the month', which proposes the work of a particular author in several languages, and all the students in the different language courses are invited to read the library's choice. Among the most successful initiatives of this Language School is the podcast 'Traducciones infieles' (trans. 'Unfaithful translations'; https://www.ivoox.com/ en/podcast-traducciones-infieles_sq_f1504463_1.html), a space dedicated to discovering and commenting on untranslatable words from the languages taught at the centre. 'Traducciones infieles' is broadcast in Onda Bierzo's Magazine, a local radio, on the first Monday of every month, and each program is stored on the school's website. The Language School's webpage functions both as a repository where many types of linguistically relevant events are stored and openly accessible, and also acts as a dissemination medium to publicise internal and external calls of potential interest to its students.

In Urueña, a nearby village of under 200 people (in the northwest and central north of Spain), cultural investments such as museums and libraries, and Spain's first 'villa del libro' (trans. 'book town'; http://www.xn-\/-uruea-rta.es/li brerias-talleres-villa-del-libro/) have revitalized the community at the turn of the 21st century. Cultural innovation here proved successful in attracting tourism and sustaining vitality, offering a replicable model for other rural areas [35]. In a small Bierzo town like Cacabelos (4700 inhabitants in 2024), which still boasts some basic services that have disappeared from its neighbouring villages, the library has launched an ongoing project for the dissemination of the lexicon of the region called 'Caldero de palabras' (trans. 'Cauldron of words'; https://www.cacabelos.org/biblioteca/2021/02/08/galego -o-caldeiro-de-palabras-nos-medios-de-comunicacion/), aimed at recovering localisms from the area, which is shaped

by both the isolation of its valleys and its closeness to linguistic borders (and hence areas of influence and potential dominance), is a fertile ground for linguistic variation and syncretism. On a daily basis, the library places a blackboard in the street, inviting local passersby to write down peculiar words, expressions, and idioms together with their respective meanings. This project, as Cacabelos's librarian and university teacher Fernando Sánchez explains, has served not only to pay homage to the town's elders but has also fostered a fruitful and bonding intergenerational debate, as the youngsters in the area have also developed their own slang and collaborate with the senior generation in the preservation and dissemination of their particular lingo. Other villages are not so proactive. This is the case of Libros, a village of a hundred inhabitants in the province of Teruel (northwest Spain), which, despite its evocative name ('libros' means 'books' in English), it did not have a library (https://laventanadeanafrank.wordpress.com/2023/07/27/li bros-a-libros-la-localidad-libros-teruel-solicita-libros-par a-abrir-una-biblioteca-publica/). This was solved thanks to a group of renowned writers and their altruistic campaign (called 'Libros a Libros') in social networks, which led to the donation of several thousand books from all over Spain and abroad. Furthermore, this campaign led to several book-based projects, such as an annual literary festival and the building of a writers' residence, and the village is experiencing an unprecedented economic revitalization.

Up to this point, our analysis has focused on a selection of initiatives aimed at showcasing the wide range of local efforts related to language promotion and preservation that have emerged within libraries located in rural inland areas of Spain. These initiatives are typically community-driven and reflect the unique sociolinguistic dynamics of their respective territories. In addition to these locally grounded actions, there exists a second category of initiatives, which are conceived and implemented within the framework of broader national and regional policy programs. For instance, both the European Commission and the Spanish government have set up various initiatives to encourage reading, support languages, and protect cultural heritage in country areas. This is all part of a wider effort to breathe new life into these places economically and socially, and to fight depopulation. Among the most impactful elements of these programs are rural libraries, which have become multifunctional community hubs. Far from just lending out books, these libraries are offering all sorts of language-related services, like collections in many languages, help with literacy for people of all ages, and programs aimed at keeping languages alive, especially in areas where there are co-official or minority languages spoken. What these services do is help nurture linguistic diversity, encourage social inclusion, and really reinforce a sense of local identity. Furthermore, rural libraries are really embracing different kinds of media, giving people access to a whole range of digital and audiovisual materials, interactive learning platforms, and cultural events that blend spoken, visual, and written ways of communication. Studies show that these initiatives are acting as powerful, practical tools for preserving languages, building strong communities, and fostering new ideas in rural areas, truly shaping the present and future of rural territories.

What follows are three illustrative successful cases. Firstly, the María Moliner Reading Promotion Campaign (https://www.cultura.gob.es/cultura/libro/maria-moliner /presentacion.html), an ongoing This program, steered by the Ministry of Culture and Sports alongside the Spanish Federation of Municipalities and Provinces (FEMP), channels support to rural public libraries through financial grants and by acknowledging truly inventive projects that promote reading. Bearing the name of the distinguished librarian and philologist María Moliner, the initiative underscores the pivotal function libraries serve as cultural and educational cornerstones within small communities.

Each year, hundreds of libraries participate, with selected winners receiving financial support to implement creative activities aimed at encouraging reading across all age groups. For example, Villar de Olalla (with over 1,000 inhabitants) and Galápagos (with over 2000 inhabitants) were finalists during the COVID-19 pandemic due to their success in virtualizing their various activities and keeping the respective populations engaged with their readings and multimodal creations in such challenging times. Secondly, Fundación Germán Sánchez Ruipérez (trans. 'Germán Sánchez Ruipérez Foundation') was founded in 1981 to foster reading habits, improve educational practices, and innovate public cultural services, especially in underserved communities, and is primarily funded through a combination of private and public sources, like the regional government of Castilla y León (northeast of Spain). It has actively developed library-school

partnerships to promote information literacy and reading culture among children and youth in rural Spain. Among the initiatives it has undertaken to support rural libraries in Spain, the following four stand out: first, the 'Centro de Desarrollo Sociocultural' (trans. 'Centre for Sociocultural Development'; CDS) in Peñaranda de Bracamonte (with 6,000 inhabitants). The task of this centre was to oversee library services and public cultural activities, with a focus on encouraging reading and getting rural communities involved in cultural life. Second, a separate initiative is the 'Centro Internacional de Tecnologías Avanzadas' (CITA; 'International Centre for Advanced Technologies'). It was launched in 2006, and its main goal is to weave advanced technology into rural areas, aiming to give a boost to education, lifelong learning, and access to information. Third, more recently, the 'Biblioteca Pública 2022 Conference' (trans. '2022 Public Library Conference') event was specifically organised to tackle the changing role of rural libraries in our current times, really stressing how vital they are for fairness in cultural access and for providing information in areas with diminishing populations. Fourth, programs like 'Libros al Sol' (trans. 'Books in the Sun'). This program is designed to promote reading in rural communities in an engaging and accessible way, involving rural libraries and bringing books and reading-related activities outdoors, typically to public spaces in small towns, so that children and families can enjoy reading during the summer or in relaxed, open-air settings. Thirdly, the 'Casa del Traductor' (trans. 'Translator's House') is a residency and support center for literary translators, funded in 1988 and located in Tarazona (a town of 10,000 habitants in the northwest of Spain). It is supported by the Spanish Ministry of Culture and local institutions and serves as a quiet, focused space for translators and visiting scholars to work, reflect, research, and collaborate, and also plays a role in the promotion of cultural exchange and the visibility of translation as a literary art form. It contains a highly specialized library with different types of resources for professional use by the translators in residence, although it is not a public lending one in the conventional sense. It focuses on translation studies, linguistics, literary theory, and multilingual literature. Among its contents, it contains a vast number of reference materials, dictionaries, style guides, and translated works useful for professional literary translators. The collection has been built over time through donations, institutional sup-

port, and the contributions of past residents. It also offers an e-office and equipment to host hybrid workshops, conferences, and training programs to promote high-quality literary translation.

The third and final type of language-based initiatives in the context of rural libraries is rooted in academic research, specifically the authors' AGORA research project presented in section 2. AGORA aims to address the many challenges faced by language teachers in remote and isolated areas under development far from urban hubs. This is being undertaken through the integration of local resources and centres with state-of-the-art research-based strategies and practices. The project is structured around microprojects involving educational centres and other local cultural institutions, namely, libraries and pedagogical museums on the one hand, and the ATLAS research team on the other hand. The outcomes are intended to be sustainable so that they continue after the life of the project. To date, eleven microprojects have been completed, among which, some stand out for involving libraries in processes like linguistic material selection, reading and writing, and foreign language learning. The first one, ADAPTA, addressed the need for inclusive access to language learning texts and materials, ensuring that all individuals, regardless of their level of disability, can undertake such actions on equal terms. Thus, a guide of accessibility principles and practices was elaborated by the research team (including educational videos, digital texts, and digital images), specifically aimed at language teachers and other library users from rural areas who required such skills for the selection and adaptation of adequate library contents. This microproject highlighted the evolving role of rural libraries, not only as places for reading and study, but also as active centers for pedagogical transformation and digital equity. The second microproject, HABLARLES, analysed school libraries as drivers of reading, learning, and psychological and emotional development. To date, two quasi-experiments have been conducted consecutively at the Juan Sobrarias School in Alcañiz: the first focused on the mother tongue, and the second on the two foreign languages taught at the school (English and French). At the heart of both these efforts was the school library. What was quite unique is that it was not some separate, closed-off room; instead, it was actually part of the main hallway, a space students were constantly passing through. While the library did not boast a huge col-

lection, the books on offer were very carefully picked out, all with the goal of encouraging students to think independently, develop critical perspectives, and reflect on ethical values. The students had the freedom to choose the books they wanted to read from a particular genre or topic, and then the idea was for them to showcase their creativity, critical thinking, and communication skills by putting together a small project based on their reading.

Feedback and evaluation were placed on personal reflection and content, rather than on formal correctness, reinforcing reading as a meaningful part of the students' education and personal development. This microproject demonstrated that even a modest, open-access library space, when paired with thoughtful book selection and student-centered practices, can effectively foster critical thinking, emotional growth, and communicative competence in multiple languages.

One of the most prominent research lines of the ATLAS group is multimodality, which they have been exploring through the sequence of microprojects LIDER and LIDIA (https://www.agora-atlas.es/microproyecto-lider-lecturas-infantojuveniles-digitales-y-enriquecidas/) within the framework of AGORA. These projects investigate the usability and educational potential of a tool developed by a consortium formed by the research groups ATLAS and LEETHI (Spanish and European Literatures: From Text to Hypermedia; https://www.ucm.es/leethi), coordinated by the authors as part of the European project eLITE (https://www.ucm.es/edicionliterariaelectronica/). This tool is now part of the UNED digital library collection under the name *Interactive Calleja*. It is based on a collection of stories from 1923 and is designed to foster reading competence in both Spanish and English, mediation skills between the two languages, and a repertoire of 21st-century skills known as the four Cs: communication, collaboration, creativity, and critical thinking. This was achieved through the incorporation of a crowd-translated, gamified translation, enriched audio recordings by amateur Spanish and British actors, embedded lexical support for all words at B1 level or higher (according to Cambridge University Press' English Vocabulary Profile: https://englishprofile.org/?menu=english-vocabulary-profile), and margin-accessible annotations containing a wealth of linguistic, textual, intertextual, and contextual information, along with formative activities. This

pioneering work had such a significant educational impact that it led to the organization of a dual virtual and physical traveling exhibition titled *Instruir deleitando: Cien Años de Lectura Infantil y Juvenil en España* (trans.'To Instruct While Delighting: One Hundred Years of Children's and Young Adult Reading in Spain'), co-curated by the authors, which visited nine locations throughout inland Spain throughout the academic year 2023-24, including university and rural libraries (such as the municipal library of Alcañiz). The virtual part of the exhibition (https://fondodigital.uned.es/s/instruirdeleitando/page/presentacion) includes a recording of the entire experience. The physical part led to a rich array of collaborations, such as the colloquium *La labor pedagógica de la Fundación Pambley* (trans. *The Pedagogical Work of the Pambley Foundation*) with Traseira Santos, Director of the Azcárate Archive and Library, and Centeno del Canto, Director of the Sierra Pambley Museum (https://instruirdeleitando.linhd.uned.es/s/instruirdeleitando/page/sedes-y-actos_II), which closed the whole national exhibition in Fabero (in the El Bierzo region, with 4000 inhabitants) in May 2024.

Finally, after the analysis of a selection of successful language-based initiatives undertaken in libraries of rural Spain, the conceptual model in **Figure 1** is included to synthesize how smart rural libraries function as hubs of transliteracy-based language services. Positioned at the center, smart rural libraries are defined by their affordable advanced technologies, community-centered mission, and the goodwill of staff and stakeholders. These libraries enact a set of core roles (educational, cultural, social, and digital) that inform a transliteracy approach: the ability to read, write, and interact across multiple platforms and media. This approach shapes a range of key functions, such as multilingual literacy, digital bridging, cultural preservation, accessibility, and intergenerational dialogue. These functions are realized through tools and media (e.g., oral, print, digital, augmented reality) and sample initiatives, which are categorized as top-down (e.g., *María Moliner Campaign*, *Bibliobuses*), bottom-up (e.g., *A Plena Cultura*, *Caldero de Palabras*), and research-based (e.g., *Interactive Calleja*, *AGORA*). The combined impact of these components leads to a range of outcomes, including inclusion, equity, multilingual and digital literacy, social resilience, and, at the individual level, identity affirmation and personal empowerment.

This repertoire of successful initiatives around rural

libraries provides a rich foundation for developing a conceptual model that captures and abstracts the diverse factors contributing to their impact. By synthesizing these real-world experiences into a visual framework, the multifaceted roles that smart rural libraries play become evident to the reader and the future researcher. Such a conceptualization not only bridges theory and practice but also serves as a strategic tool for high-level replication and policymaking, enabling the design of future library initiatives that are both locally meaningful and future-ready.
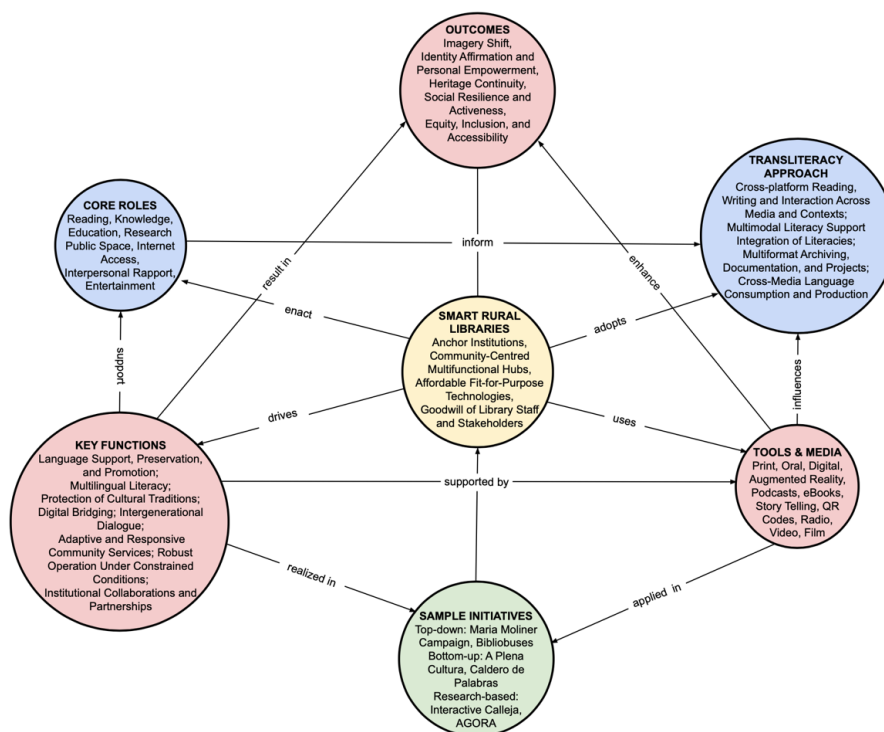
Figure 1. A conceptual model for smart rural libraries informed by transliteracy.

This conceptual model represented in **Figure 1** depicts smart rural libraries as dynamic, people-centered institutions that operate at the intersection of multiple roles, functions, tools, and outcomes, all grounded in a transliteracy approach. At the core of the model, smart rural libraries are envisioned as anchor institutions that are affordable, community-centered, and multilingual, sustained by the goodwill of staff and stakeholders. What these libraries do, at their very core, is vital: they open doors to knowledge, reading, education, and shared public spaces. And this leads to real, concrete results, like people feeling a stronger sense of their identity, becoming more empowered personally, ensuring their heritage continues, and fostering a more inclusive society. Underpinning all this are some key functions they perform, e.g., promoting literacy in multiple languages, bridging the digital divide, preserving cultural heritage, and encouraging dialogue between different generations. To achieve this, these libraries embrace a transliteracy approach. This really means they focus on reading, writing, and interacting across all sorts of platforms, and they bring together different kinds of literacies and media formats, including a wide mix of tools and media – from traditional print and digital resources to podcasts, augmented reality, video, and radio—all to meet the varied needs of the people they serve. These tools are not just technological enablers but are influenced by the transliteracy approach and inform how knowledge is consumed, created, and shared. Finally, the model is grounded in sample initiatives, ranging from government-led campaigns like María Moliner to grassroots projects like ÁGORA or vernacular heritage preservation efforts, which illustrate the multifaceted way in which smart library models are realized in practice. These components are deeply interconnected, highlighting how transliteracy transforms rural libraries into inclusive, resilient hubs of lifelong learning and community engagement, tailored to local contexts and everything that holds unique meaning for them.

4. Conclusions

This article has proposed a reconceptualization of the smart library through a transliteracy lens, exploring its transformative potential in rural contexts, the premise being that the best library is not the largest or the most modern but the one that serves its target community to the fullest: one that enables books to be read and ideas to be exchanged, but also one that protects and strengthens local development and its human and heritage treasure. Moving beyond a merely technological understanding of 'smartness,' we have argued for an expanded, inclusive notion that incorporates cultural relevance, educational equity, and collective engagement. The concept of transliteracy has been shown to bring a novel perspective of smart libraries not only as digitally enhanced infrastructures but as dynamic, people-centred ecosystems capable of offering their users multidimensional literacies and fostering emotional and social ties between them in ways that are meaningful to them, in their own territories, on their own terms.

One of the central insights emerging from this study is the capacity of rural libraries to become catalysts of renewal by acting as community anchors in areas marked by depopulation, infrastructural decline, and socio-cultural invisibility. As Spain's 'emptied territories' continue to suffer from demographic and economic imbalance, smart rural libraries offer a unique opportunity to reverse these trends, not through industrial initiatives on a large scale, but through deeply human and culturally embedded actions. These actions are not devoid of multiple challenges (such as structural support, political will, and adequate funding), but they usually rely on the goodwill of committed professionals and volunteers who were typically born and bred in the respective territories where these actions are being implemented. In sum, these libraries exemplify a form of 'rural smartness' that stems from ideals of personal engagement and intergenerational transmission, and principles of participatory governance (a concept referred to as 'activeness' in Read & Barcena's [36] terminology) and aspiration for improvement. Thus, some Spanish rural communities, as illustrated through the case of El Bierzo and other examples, are actively reshaping the narrative of technological inclusion as they deem appropriate. Low-budget projects such as a cultural association made up of volunteers, technologically enhanced book lending buses, the library of a language school in a small town, and a collaborative vernacular language preservation initiative serve to demonstrate how smart library models can be when they are organically adapted to local values and needs.

What is key is how these projects frequently put language right at the heart of their efforts to connect with people. This might be through offering materials in many languages, supporting those learning a second language, or providing translation and interpretation to bridge communication gaps that can arise between generations, across cultures, or with migrant communities. The language services themselves, which include literacy programs in minority languages and digital tools for learning languages, do more than just promote a sense of inclusion and accessibility; they are also fundamental to protecting linguistic diversity as an irreplaceable part of cultural heritage. Perhaps most impressively, and often drawing on a real intuitive sense, the individuals driving these initiatives have succeeded in crafting programs that cleverly blend different kinds of literacy (print, media, ecological, and computer literacy, among others). They manage this while staying deeply sensitive to the unique character of their region, especially in today's increasingly complex demographic landscape, reaching out across all ages (there's even a reading program for newborns!), educational attainments, and cultural experiences.

By listening closely to community voices, smart rural libraries can embrace the contributions of ordinary people and facilitate intergenerational and intercultural exchanges. By acknowledging the diversity of communication modes: from oral storytelling to digital podcasts, from handwritten memory to augmented reality, etc., transliteracy supports the idea that learning and literacy are not doomed to formal settings or singular technologies, and offers a holistic approach to knowledge that goes beyond a mere technological upgrade of the old library, reflecting the actual media practices of people all over the world today. It is in this approach that the necessary skills to be literate in the 21st century lie, which include making sense of messages in a multiplicity of channels, critically understanding them, and efficiently communicating through the different devices available in the new media ecology. It is in this manner that smart libraries have the opportunity to play a fundamental role in the creation of a smart countryside, not only in Spain but around the world.

Author Contributions

Conceptualization, E.B. and M.G.; methodology, E.B. and M.G.; formal analysis, E.B. and M.G.; investigation, E.B. and M.G.; resources, E.B. and M.G.; data curation, E.B. and M.G.; writing—original draft preparation, E.B. and M.G.; writing—review and editing, E.B. and M.G.; visualization, E.B. and M.G.; supervision, E.B. and M.G.; project administration, E.B.; funding acquisition, E.B. Both authors have contributed substantially to the work reported and agreed to the published version of the manuscript.

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Data sharing is not applicable as no datasets were generated during the current study.

Conflicts of Interest

The authors declare no conflict of interest.

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