Child-focused challenges in the digital transformation of government services.

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Abstract. The digital transformation of government services fundamentally reshapes how citizens engage with public institutions and services, creating new opportunities and challenges for inclusive governance in the digital age. Amongst the most critical yet often overlooked stakeholders in this transformation process are children, who represent a significant portion of the global population and the future drivers of digital innovation and civic participation. As digital platforms become central to service delivery, children's unique needs, rights, and vulnerabilities must be explicitly addressed to ensure equitable access, protection, and empowerment. This paper examines the implications of government digital services for children in some selected countries. The paper focuses on governments' role as stakeholders in shaping public services and the importance of contributing to digital literacy, safeguarding privacy, and promoting child-friendly participation mechanisms. Drawing on five-country case studies – Bangladesh, Brazil, Ghana, Sweden, and Timor-Leste - the paper highlights the challenges and opportunities associated with integrating child-sensitive approaches into digital governance. The cases provide insights into how digital government services can increase active citizenship and civic engagement among children and their families while addressing disparities in access and usage. The findings build on a collaborative study conducted in 2021 by the United Nations Children's Fund (UNICEF) and the United Nations University Operating Unit on Policy-driven Electronic Governance (UNU-EGOV). The study underscores the transformative potential of child-sensitive digital government initiatives in promoting early civic participation and empowering marginalized communities. The analysis emphasizes the need for a nuanced understanding of age-specific requirements, improved data collection mechanisms, and a coordinated whole-of-government approach to digital transformation. By integrating child-sensitive practices into digital governance, children's rights are not only safeguarded by governments but also spurs a generation of digital literates, active citizens who are empowered to impact their communities and futures. This paper calls for a concerted effort to prioritize children in digital governance strategies, ensuring that no child is left behind in the digital era. Key contributions include the identification of best practices in inclusive ecosystems, the articulation of a holistic framework for digital service delivery and online safety, as well as the enhancement of strategies for bridging digital divides for marginalized children.

Keywords. Children, COVID-19 Era, Digital transformation, Government digital services, Inclusivity.
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1. Introduction

Digital technologies, through rapid advancement, are fundamentally reshaping economies and societies, presenting the potential to permanently transform the nature of modern governance (UNICEF & UNU-EGOV, 2021) and public service delivery. Societal transformations driven by digital technologies have reshaped how individuals interact with governments globally (Van Veldhoven & Vanthienen, 2022). Moreso, it has offered transformative opportunities to improve the efficiency, reach, and quality of government services (Nagy, 2017; UNICEF & UNU-

EGOV, 2021) for citizens. The advent of the 'digital evolution' holds the promise of enhanced governance, more inclusive service delivery, and increased responsiveness through the utilization of information and communication technologies (ICT) (Nagy, 2017). Therefore, digital government services have emerged as critical tools for enhancing citizen engagement, streamlining bureaucratic processes, and addressing complex societal challenges (Nagy, 2017; Van Veldhoven & Vanthienen, 2022). Governments worldwide have embraced this transition to e-government, with a central focus on digitizing sectors such as public health, education, social services, and identity management.

During the COVID-19 pandemic, the adaptation of digital solutions accelerated globally (Van der Voort, 2020), demonstrating the potential to maintain essential public services in times of crisis (Amankwah-Amoah, Khan, Wood & Knight, 2021; Janssen & Van der Voort, 2020). However, the accelerated pace of digital transformation also brought to the forefront existing inequalities and created new challenges, particularly for marginalized and vulnerable populations, including children (Ranganai, Muwani, Zivanai, Munyoro & Sakadzo, 2022). Children, as a demographic group, are distinctively positioned in the digital transformative narrative (Keeley & Little, 2017; Livingstone & Third, 2017) as both active users of digital services, particularly in education, healthcare, and social protection and passive recipients of the broader public policies that increasingly rely on digital tools and technologies (UNESCO, 2016; Van Veldhoven & Vanthienen, 2022). Despite their critical significance as stakeholders, children's specific needs and rights are often overlooked in digital governance strategies. Issues such as access disparities, digital literacy gaps, online safety, data privacy, and age-appropriate service design remain underexplored and inadequately addressed in many countries (Fosch-Villaronga, Van der Hof, Lutz, C., & Tamò-Larrieux, 2023; Livingstone & Third, 2017).

Globally, disparities in digital inclusion persist, shaped by socioeconomic inequalities, infrastructural limitations, and governance frameworks (Helsper, 2021). These challenges are majorly present in low-middle-income countries, where children face intense barriers to accessing digital services (UNICEF & UNU-EGOV, 2021). For instance, children in rural areas often struggle with limited internet connectivity, while those in urban poor communities may lack access to affordable digital devices or adequate digital literacy training. In high-income countries with advanced digital infrastructures, gaps in child-focused policies and practices persist, which may undermine the potential benefits of digital government services (Livingstone, Stoilova & Nandagiri, 2019). Addressing these challenges requires a nuanced understanding of the socio-economic, cultural, and institutional contexts that shape digital service delivery for children (Hammond, Polizzi & Bartholomew, 2023).

Furthermore, the rapid digitization of government services raises critical questions about equity and inclusivity (Latupeirissa, et al., 2024; Ranchordas, 2022). Are these services designed to accommodate children from diverse backgrounds, including those with disabilities, those from minority groups, and those living in fragile contexts? Are the risks associated with increased online engagement, such as cyberbullying, exploitation, and exposure to harmful content, adequately reduced? While digital technologies offer transformative potential, their benefits cannot be fully realized without addressing these pressing challenges. Consequently, digital services have become increasingly common in the 21st century; their significance has been magnified during the global COVID-19 pandemic, especially for children and their families (Robinson, et al., 2020; Mok, Xiong & Bin Aedy Rahman, 2021). This presents a pressing need to ensure digital services align with inclusivity, child rights, and safety. Despite the potential of digital services to improve the relevance and accessibility of services for children, there is a lack of systematic comprehension regarding available service types and the facilitating factors that guarantee their alignment with inclusivity, child rights, and safety (Latupeirissa, et al., 2024). The need for systematically exploring the discourse and the practices that ensure government digital services advance and protect the rights of children and young adults cannot be overemphasized (Hammond, Polizzi & Bartholomew, 2023; Ranchordas, 2022). Governments must enhance their capacity to secure data and address the demands of parents and society in ensuring inclusivity, online safety and delivering improved services.

The article critically examines the challenges and opportunities of digital government services for children across five diverse countries: Bangladesh, Brazil, Ghana, Sweden, and Timor-Leste. These countries were selected as they represent a broad spectrum of socio-economic development, different levels of government maturity, and digital infrastructure; providing valuable insights into how digital transformation impacts children in varied contexts. Bangladesh and Ghana, for instance, highlight the barriers faced by low-income nations with limited resources (Graham, 2019), while Brazil showcases a middle-income country's efforts to balance rapid urbanization with digital inclusion (Mazzucato, 2024). In contrast, Sweden exemplifies the approach of a high-income nation with advanced digital systems (Ericsson & Mealy, 2019), and Timor-Leste offers a unique perspective as a post-conflict country striving to build a resilient digital future (McWilliam, 2020). An in-depth study analysis was conducted on the countries' government and norm-setting institutional websites (UNICEF & UNU-EGOV, 2021). Explorative interviews were also conducted in 2021 to complement the data collected from the respective government repositories. The findings of this study underscore the urgent need for child-sensitive digital government strategies that prioritize inclusivity, equity, and the protection of children's rights.

This article adds to the extant literature and makes key contributions, including a holistic framework for online

safety and advancing strategies for bridging digital divides for marginalized children. It extends theoretical discussions by linking digital government services to active citizenship and early civic engagement. Practical and actionable recommendations for creating a safer, more inclusive digital future for children are proposed for policymakers, educators, and technologists. By integrating child-centric perspectives with strategies for inclusion and equity, the study provides a roadmap for creating safer and more inclusive digital ecosystems for children globally. The remaining part of the paper is structured as follows: Section 2 describes the research methodology used to conduct the study. Section 3 discusses the findings relating to the key issues and challenges raised in the study, and proposes a holistic whole-of-government framework for delivering government digital services. Sections 4 and 5 conclude with the article's conclusion and recommendations for ways forward and further analysis.

2. Methodology

2.1 Global survey

A comprehensive global survey of government and norm-setting institutional websites was conducted (UNICEF & UNU-EGOV, 2021) to address the persistent issues mentioned in the introduction. The survey aimed to identify the digital services available to children and their families, focusing on understanding their unique needs, rights, and vulnerabilities (Keeley & Little, 2017; Singh, et al., 2020). The survey also sought to uncover gaps in accessibility, usability, and inclusivity, highlighting areas where digital government services could be improved to better serve marginalized and underserved communities.

A thorough review of relevant academic and grey literature was conducted to complement this approach. The review provided a foundational understanding of the broader socio-political and technological contexts in which digital services are developed and implemented. It also provided insights into best practices, emerging trends, and persistent challenges in digital governance for children. Furthermore, to know citizens' perspectives, explorative interviews were conducted with 28 representatives from government institutions, civil society organizations, and international bodies (UNICEF & UNU-EGOV, 2021). These interviews provided nuanced, context-specific insights into the five countries' design, implementation, and challenges of digital government services.

2.2 Case Study Analysis

All five countries were selected based on their varied socioeconomic conditions, levels of digital infrastructure, and strategic approaches to digital governance. Bangladesh and Ghana represent low-income countries grappling with significant barriers to digital inclusion, such as limited connectivity and resource constraints (Graham, 2019). Brazil is a middle-income country demonstrating the complexities of balancing rapid urbanization with equitable digital access (Mazzucato, 2024). Sweden is a high-income country with advanced digital infrastructure and presents best practices and innovative strategies for inclusivity (Ericsson & Mealy, 2019; UNESCO, 2020). Finally, as a post-conflict state, Timor-Leste provides a unique perspective on the challenges and opportunities of building resilient digital systems in fragile contexts (Ribeiro, Clarke & O'Donoghue, 2020; Timor-Leste Ministry of Education, 2022).

The findings from the survey, literature review, and interviews have been synthesized to provide a holistic understanding of the challenges and opportunities associated with digital government services for children. Key themes explored include accessibility, digital literacy, online safety, data privacy, and the alignment of digital services with child rights and inclusivity principles. Table 1 below presents a concise overview of all five countries, highlighting their socio-economic profiles, digital maturity levels, and strategic focus areas for digital government services. This contextual information global survey and case study analysis are critical for understanding the impacts of digital transformation on children and for identifying scalable and context-sensitive solutions that prioritize equity and inclusivity.

Tab. 1 – Countries considered for the study and a brief description of each.

Country	Income group	Structural set-up	Area of interest
Bangladesh	Low-income	Federal, with central coordination of digital transformation. Federal authorities deliver the majority of services. Weak local authorities.	An emerging Asian economy where digitizing services, increased inclusion, and accessibility in rural areas is a key strategic focus (https://a2i.gov.bd/).
Brazil	Medium-income	Federal, strong state, and local government rights and autonomy. The majority of services are delivered by state and local authorities. A	An emerging Latin American economy, where the rights and well-being of minors follow a mainly classical ICT approach.

		mix of strong and weak local authorities.	
Sweden	High-income	Unitary, strong central government coordination but with decentralized implementation. Over 70% of services are delivered by local authorities.	A European country known for its innovative approaches to education (e.g., educational outcomes, blended play, and experience-based learning) and also technology.
Ghana	Low-income	Unitary, strong central government coordination. The central government delivers the majority of services. Weak local authorities.	Emerging African economy with an emerging tech scene and increased focus on public sector transformation and access to technology and government services.
Timor-Leste	Low-middle-income	Unitary, strong central government, no regions or local authorities. The central government delivers all services.	Asian and emerging within the tech scene. Beginning to aim towards public sector transformation, access to digital technology and services.

Source: Author, UNICEF & UNU-EGOV

The selection of countries also aims to provide a diverse representation, encompassing various levels of economic development, a spectrum of service portfolios, and different stages of governmental digital transformation. For instance, in Table 2 below, Timor-Leste identified as a low-middle-income country with limited public services, is in the initial phases of ICT infrastructure rollout, accompanied by comprehensive plans for e-government. In contrast, Sweden, a high-income welfare state consistently ranked amongst the top 10 countries globally in e-government development, offered a contrasting perspective with its advanced digital transformative initiatives.

Tab. 2 – Current socioeconomic indicators of case countries.

Indicator Description	**Bangladesh**	**Brazil**	**Ghana**	**Sweden**	**Timor-Leste**
Population, total (World Bank, 2023)	171.47	211.14	33.79	10.54	1.38
Percentage of the child population	38.79	32.99	47.83	23.12	59.69
Urbanization (Worldometer, 2024)	42%	91%	57.90%	87.0%	36%
GNI per capita ($) (PPP) (World Bank, 2023)	9,510	20,470	7,450	71,780	5,620
Literacy rate (% ages 15 - 24) (WB)	95% (2021)	99.28% (2022)	93.48% (2020)	99% (2023)	85.10% (2020)
Employment to population ratio (% ages 15 and above – modeled ILO estimated)	55.73%	57.9%	66.38%	62%	65.5%

(WB, 2023)					
Youth not in school or employment (% ages 15 and above) (WB, 2020)	27.39	24.16	30.50	6.13	20.95
Internet users (% of the population) (WB, 2023)	44.50%	84.15%	69.84% (2022)	95.70%	40.75% (2022)
Mobile phone subscriptions (per 100 persons) (WB, 2022)	105.26	98.89	119.62	125	110
E-Government Development Index Ranking (UNDESA, 2025)	0.6570	0.8403	0.6317	0.9326	0.4020

Source: Author. Adopted from UNICEF and UNU-EGOV, 2021, and updated to current data.

2.3 Development and preparation of semi-structured interviews

The interview guide and questions were mainly developed, drawing upon literature from government repositories, academic publications and reports. These resources provided a solid foundation for framing the questions (International Social Security Association, 2019; Neilson, 2019), ensuring they addressed the specific aspects of digital government services for children and their families. The interview was designed to explore a range of topics, including accessibility, usability, inclusivity, data privacy, and the overall impact of digital government services on children. To capture the diverse needs and experiences of children, the study focused on three distinct age groups:

- Infants and young children (ages 0-4): This group primarily relies on their parents and guardians to access government services. Questions for this group focused on the impact of digital services and the role of parents or caregivers in navigating these systems.

- School-age children (ages 5-14): As direct beneficiaries of many government services, such as education and healthcare, this group often accesses digital services through intermediaries like teachers, healthcare providers, or family members. The questions emphasized their experiences and the effectiveness of intermediaries in facilitating access.

- Adolescents (ages 15-18): This group has growing independence and, in many cases, legal rights comparable to those of adults. Questions addressed their direct use of digital services, their perspectives on accessibility and usability, and their awareness of privacy and data protection issues.

The semi-structured interview underwent multiple rounds of review and refinement to ensure cultural sensitivity and contextual relevance. It was designed to facilitate open-ended responses, encouraging interviewees to share detailed insights and personal experiences related to digital government services. The interview guide will be shared via email upon request.

2.4 Data collection and field activities

The data collection process was a collaborative effort between UNICEF and UNU-EGOV, with a focus on ensuring comprehensive and representative findings. The first step involved the careful selection of the five case countries listed in Table 1 above. The countries were chosen to reflect a diverse range of socio-economic conditions, levels, and stages of digital transformation, and their strategies for digital governance. The next phase involved identifying key stakeholders, including government agencies, non-governmental organizations (NGOs), international non-governmental organizations (INGOs), civil society organizations (CSOs), and other relevant entities. Potential interviewees were selected based on their expertise and involvement in digital service delivery, policy-making, or

advocacy relating to children's rights and digital governance.

The data collection exercise took place between February and April 2020. Semi-structured interviews were conducted using the prepared interview guide. This allowed for flexibility in probing specific themes while maintaining consistency across interviews. The interviews were carried out by team members from both UNICEF and UNU-EGOV (UNICEF & UNU-EGOV, 2021), ensuring a balanced representation of expertise and perspectives during the data collection process. Furthermore, field activities included the analysis of policy documents, government reports, and service delivery frameworks to contextualize the insights from interviewees. This multi-method approach ensured a robust understanding of the challenges and opportunities associated with digital government services for children. This systemic and collaborative process allowed the study to generate detailed context-specific findings that highlighted the transformative potential of the digital services of the case countries while also addressing the specific needs and vulnerabilities of children in the case countries.

3. Findings and Discussion

3.1 The general state of affairs of digital services for children globally

Accessing digital services in recent times has created a unique space for children, transforming them into active users of the internet and digital technology (Janssen & Van der Voort, 2020; Keeley & Little, 2017; Fosch-Villaronga, Van der Hof, Lutz & Tamò-Larrieux, 2023; Helsper, 2021). Thus, the rise in internet connectivity and the availability of digital platforms have significantly reshaped how children interact with the world (Keeley & Little, 2017). This transformation has been further accelerated by the advent of the COVID-19 pandemic, which has necessitated the shift to online spaces for education, healthcare, and various social and entertainment activities – many of which have educational components. These developments have redefined childhood experiences, creating new opportunities and challenges for minors in the digital age.

Global data highlights the pervasive reach of digital technologies, with an estimated 3.89 billion people in 2018 (Hammond, Polizzi & Bartholomew, 2023; Hernandez & Roberts, 2018). However, since COVID-19, this has increased to an estimated 5.52 billion people, which is equivalent to 67.5% of the world's total population (DataReportal, 2025). Following this new and intense era of crisis for children and recent technology trends, the potential risks for children have indeed become a continuation of the reality of the past several years. Children aged 15 years and older have emerged as the most avid subgroup of minors and young adults connected online. As of 2023, approximately 79% of children and young adults aged 15 to 24 globally are active Internet users (International Telecommunication Unit, 2023). This indicates that 21% of the age group remains unconnected (ITU, 2025).

A growing body of evidence underscores the multifaceted benefits of digital access for children (Hammond, Polizzi & Bartholomew, 2023; Keeley & Little, 2017). Access to digital services has proven instrumental in various ways, particularly in education (Haleem, Javid, Qadri & Suman, 2022; Williamson, 2017). Online school activities and out-of-school educational resources are two prominent avenues through which children leverage digital technologies (McNaughton, et al., 2022). These tools have democratized access to quality education, enabling learners to access diverse resources and engage with interactive content irrespective of geographic or socioeconomic barriers (Keeley & Little, 2017). However, the advantages of digital opportunities extend far beyond education (Parveen & Ramzan, 2024). Children engaging with digital services, particularly in the global northern hemisphere, encounter various opportunities, including developing digital literacy and communication skills and exploring creative and innovative activities (Haddock, Ward, Yu & O'Dea, 2022). For instance, digital platforms often serve as spaces for collaboration, where children can connect with peers globally, exchange ideas, and participate in social and civic initiatives and engagements.

Findings from the 2018 Programme for International Students Assessment (PISA) reveal that 95% of 15-year-olds across OECD countries have access to some form of digital services (Avvisati & Givord, 2021). This high level of connectivity suggests that digital technologies have become an integral part of young people in the global northern hemisphere. However, notable disparities exist in accessibility and usability across different demographic and geographic groups, particularly when considering children in the global south. More so, while substantial data on internet usage by adolescents aged 15 to 18 exist, there still remains a significant gap in the digital experiences of younger children aged 0 to 14 (Livingstone, Stoilova & Nandagiri, 2019).

The literature review revealed limited data on the ages of 0 to 14, leaving gaps and critical questions on their technology access and usage patterns. Furthermore, other significant indicators such as gender, age, and geographic location are often underexplored, resulting in an incomplete understanding of the state of affairs or digital landscape for children. This lack of data poses a challenge for policymakers, educators, and stakeholders aiming to ensure equitable access and address the risks associated with digital engagement (Livingstone, Stoilova & Nandagiri, 2019). To address these gaps, there is a pressing need for comprehensive research that explores the digital experiences of younger children, disaggregated by key variables such as age, gender, socioeconomic status,

and geographic location.

3.2 Accessibility

The study revealed significant disparities in children's access to digital government services, primarily driven by socioeconomic and geographic factors. In low- and middle-income countries such as Bangladesh and Ghana, inadequate infrastructure and high costs of digital devices are major barriers. For instance, recent ITU (2023) statistics show that only 40% of households in low-income countries have internet access, compared to 90% in high-income countries. More so, rural areas often lack the connectivity needed to access digital services, leaving children in these regions disproportionately disadvantaged.

In Bangladesh, programs such as "*Digital Bangladesh*" aim to improve access by providing internet-enabled education hubs and affordable devices (Digital Bangladesh Vision, 2020; United Nations Development Programme, 2021). However, logistical challenges and resource constraints often limit their reach (Dappe, Kunaka, Lebrand & Weisskopf, 2019). Ghana has made advancements with initiatives such as public-private partnerships to expand connectivity, yet progress remains slow in rural areas. Furthermore, these challenges are spurred by socioeconomic inequalities, as families in lower-income brackets often prioritize basic needs over digital resources.

In Timor-Leste, digital transformation is in its nascent stages (Timor-Leste Ministry of Education, 2022), facing unique challenges, including the lack of localized content and limited awareness of digital tools among educators and parents (Ribeiro, Clarke & O'Donoghue, 2020). Community-based approaches, such as local internet hubs and collaborative education platforms, have shown promise (Srinivasan, Jishnu & Shamala, 2021) but require scalability and sustainability to create a meaningful impact (Guglielmi et al., 2021). In contrast, Sweden exemplifies best practices through universal broadband coverage and subsidized digital services and devices for students, ensuring equitable access (Lazar, Goldstein & Taylor, 2015). However, in high-income countries, children from immigrant and minority backgrounds often encounter linguistic and cultural barriers to accessing government digital services, highlighting the need for tailored approaches and alignment to inclusion.

3.3 Online Safety

Online safety emerged as a critical concern across all case study countries. Children's increased use of digital platforms has brought about exposure to risks such as cyberbullying and identity theft, as well as exposure to harmful content. According to the UNICEF report (2021), 1 in 3 internet users globally is a child. Yet, fewer than half of all countries have implemented comprehensive online safety policies that align with the needs of children online. In Brazil, the legal framework for child protection in digital spaces includes initiatives for eliminating cyberbullying and preventing exploitation (Third, Livingstone & Lansdown, 2019). However, there are gaps in enforcing these laws (Brazilian Internet Steering Committee, 2021), leaving children vulnerable, especially children in underserved regions where digital literacy remains low.

In Ghana and Bangladesh, vulnerabilities are exacerbated by limited awareness among parents and educators. Thus, children are often left to navigate online spaces without adequate guidance or safeguards (Ghana Investment Fund for Electronic Communications, 2022; United Nations Development Programme, 2021). These regions urgently need structural training programs to educate stakeholders on digital safety practices engagement (Livingstone, Stoilova & Nandagiri, 2019). Sweden has proactive measures in place, such as "Digital Resilience Programs," which are integrated into school curricula (Swedish National Agency for Education, 2021). These measures ensure that children are taught how to identify and mitigate online risks. The programs also lay emphasis on parental involvement, recognizing the critical role-play of families in promoting safe online behaviors.

3.4 Inclusivity in Education

Digital education holds immense potential to bridge learning gaps, yet inequalities are often intensified (Bozkurt, et al., 2020). The COVID-19 pandemic exposed the fragility of digital education systems, particularly in low-income countries (Srinivasan, Jishnu & Shamala, 2021; West, Kraut & Ei Chew, 2019). In Ghana, only 20% of students had access to online learning platforms during school closures (Agormedah, Henaku, Ayite & Ansah, 2020; GIFEC, 2022; Owusu-Fordjour, Koomson & Hanson, 2020), compared to almost universal access in Sweden (Pramling Samuelson, Wagner & Eriksen Ødegaard, 2020; SNAE, 2021). These disparities showcase the urgent need for targeted intervention to ensure inclusivity.

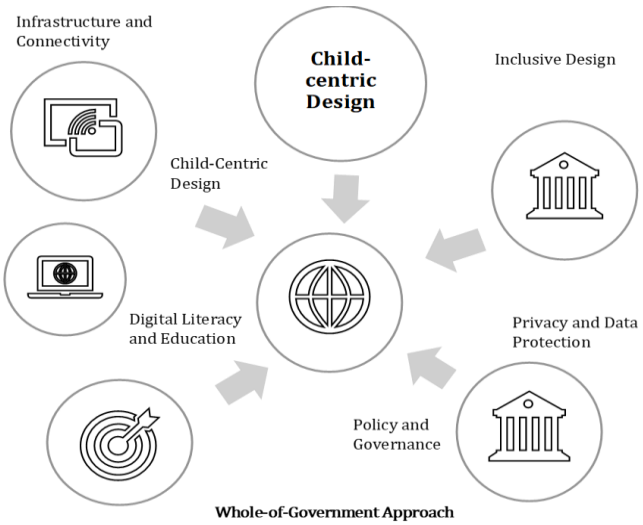
Innovative solutions, such as mobile-based learning platforms and community internet hubs, have shown possibilities in improving access in resource-constrained settings (Srinivasan, Jishnu & Shamala, 2021). For instance, Brazil has presented programs that use television and radio to deliver educational content to students without internet access, ensuring a broader reach (Brazilian Network Information Center, 2021). More so, partnerships with technology companies have enabled the distribution of low-cost tablets and preloaded educational content to underserved communities (NIC.Br, 2021; Third, Livingstone & Lansdown, 2019).

Sweden's inclusive education model incorporates assistive technologies for children with disabilities and multilingual platforms for immigrant students, ensuring no child is left behind (Tajic & Bunar, 2023; UNESCO, 2020). The findings emphasize the significance of integrating digital literacy into school curricula, providing teacher training on digital tools, and ensuring that digital platforms are accessible to children from diverse socioeconomic backgrounds. Furthermore, creating partnerships between public institutions and private organizations can help fund innovative solutions for inclusive education ((Tajic & Bunar, 2023).

3.5 Government digital services for increased citizens' engagement

This section presents a holistic framework to illustrate some of the key components and interconnections required to design and deliver inclusive and effective government digital services for children in all five case study countries.

Fig. 1 – Framework for Government Digital Services



Source: Author

Elements in the framework play a critical role in ensuring that services are accessible, equitable, and responsive to citizens' needs, especially children. The infrastructure and connectivity pillar presents the foundational layer of digital services (Camarinha-Matos, Fornasiero, Ramezani & Ferrada, 2019; Serrano, 2018). It focuses on ensuring that the physical and technological infrastructure, such as broadband networks, mobile towers, satellite coverage and electricity are readily available and accessible, especially in the underserved and remote areas. Thus, without robust connectivity, citizens in marginalized regions risk being excluded from accessing government digital services.

The digital literacy and education component presents the capability of citizens to effectively use digital technologies. Programs within this area must push for the use of digital skills among children, educators, parents and communities. This will help ensure that citizens are equipped to navigate digital or online government platforms, use e-learning tools, and access resources safely and effectively. The Child-centric design pillar focuses on designing digital platforms and services that align with children's unique needs and rights. Services around this pillar must feature intuitive interfaces, age-appropriate content, and tools for meaningful citizen participation. For instance, digital platforms must integrate child-friendly features, such as simplified navigations and visuals that reverberate younger users.

The privacy and data protection pillar highlights the need to safeguard sensitive data, particularly for children, as they may be conversant with the digital risks associated with online activities. It lays emphasis on implementing encryption, anonymization, and robust data protection policies to ensure users' safety (Third, Livingstone & Lansdown, 2019). Legal frameworks and monitoring mechanisms are also critical to enhancing trust in digital systems, especially for children (Felzmann, Villaronga, Lutz & Tamo-Larrieux, 2019). The policy and governance pillar provides the strategic and regulatory framework for the delivery of digital services, emphasizing cross-sector collaboration, inclusive policies, and government accountability. Thus, the governance framework ensures equitable accessibility to resources while addressing the digital divide, cybersecurity, and other challenges.

The inclusive outcomes and whole-of-government approach are the central elements of the framework. The inclusive outcomes represent the ultimate goal of digital services, which are equitable access, inclusion, and

empowerment of all citizens, especially children and marginalized communities. The whole-of-government approach highlights the need for coordination across multiple multilateral collaborators and sectors for the delivery of both unified and seamless digital services for children.

4. Conclusion

The digital transformation of government services continues to present unique opportunities for addressing systemic inequalities and empowering children. However, realizing this potential requires a sustained and strategic commitment from policymakers, educators, and technology developers. The paper examined the challenges and opportunities inherent in using digital platforms to improve accessibility, online safety, and inclusivity for children. The findings emphasize that while significant strides have been made globally, many systemic barriers persist, including infrastructure limitations, socioeconomic disparities, and gaps in online safety. Children's access to digital government services is often dictated by their geographic location, household income, and the availability of localized, culturally appropriate resources (Mathrani, Sarvesh & Umer, 2022; UNICEF & UNU-EGOV, 2021). Addressing these disparities requires efforts toward bridging the digital divide through robust infrastructure investment, affordable access to digital devices and the internet, and policies that prioritize the needs of underserved communities.

Governments must approach digital transformation through a child-centered perspective to ensure that digital services accommodate children's basic needs and actively contribute to their empowerment and protection. Thus, governments must continue adjusting their digital transformation strategies while embracing children's needs. This will require moving beyond short-term fixes to adopt long-term, sustainable strategies that address the root causes of digital exclusion. More so, ensuring that children can safely navigate digital platforms, particularly due to their high susceptibility to risks is of great significance. Governments must implement comprehensive and effective online safety frameworks that balance not only regulation with education but also empower both children and their guardians to use digital tools and technologies responsibly.

Governments must collaborate with international organizations, civil society groups, and the private sector to establish inclusive digital ecosystems. Furthermore, ensuring transparency and accountability in the implementation of digital initiatives. This is critical to building trust and achieving outcomes. Success in digital transformation efforts and initiatives will depend on adapting to evolving technologies while maintaining a persistent commitment to equity, safety, and inclusivity. Finally, the study underscores the need for international and multilateral collaborations to develop and share best practices, including tools for monitoring digital activities and implementing early warning systems and scalable frameworks for cross-border cooperation.

5. Recommendation

The study recommends the following key points:

5.1 Infrastructural expansion

Investing in robust and accessible internet infrastructure, prioritizing underserved and rural areas to bridge the digital divide. More so, governments' introduction of subsidized initiatives and programs will result in digital tools and internet accessibility that are also affordable for low-income families.

5.2 Enhancing online safety

Establishing comprehensive and effective online safety policies that include education on digital risks, implementing robust content filtering systems, and stringent penalties for cybercrimes targeting children. Also, having effective collaborations to develop a unified framework for child online protection.

5.3 Promoting inclusive education

Inclusivity in education remains a key foundation for equitable digital transformation. The integration of digital literacy into educational and school curricula, as well as the provision of continuous professional development for educators and teachers to effectively use digital tools is extremely significant. Also, expanding access to assistive technologies for children with disabilities and designing multilingual platforms to accommodate diverse linguistic needs cannot be overemphasized.

5.4 Pushing for collaboration

Develop multi-stakeholder partnerships that bring together government, non-governmental organizations (NGOs), international organizations, and the private sector to co-create solutions that address accessibility, safety, and inclusion. Making use of public-private partnerships to fund innovative projects and initiatives, and also ensuring the sustainability of these projects and initiatives are significant factors for consideration.

5.5 Implementation of data-driven strategies

Governments must regularly collect and analyze data to monitor the effectiveness of their digital initiative. The use of evidence-based research and/or data to refine strategies, identify emerging challenges, and adapt to the changing technological landscape is critical to the success of any digital transformation journey.

5.6 Encouraging civic engagement and community participation

Actively involve children, parents, and local communities in designing and implementing digital services to ensure real needs are addressed and cultural contexts are considered.

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