Coding Futures: Rethinking Digital Literacy Policies in Senior High Schools as Catalysts for Inclusive Economic Growth

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Abstract. *Digital literacy has become a key foundation for educational innovation and economic participation in the 21st century. As global economies transition toward digitalization, integrating digital competencies into senior high school curricula is increasingly viewed as essential for supporting Sustainable Development Goal 8 (SDG 8), which emphasizes decent work and inclusive economic growth. This study investigates the role of public policy in shaping digital literacy education in senior high schools through a comparative case study of Indonesia, the Philippines, and Canada. Employing qualitative policy analysis, the research explores how each country's policy framework conceptualizes, implements, and evaluates digital literacy initiatives. The analysis focuses on curriculum integration, resource allocation, and stakeholder involvement, while also examining how these programs contribute to employability and economic resilience. The findings reveal notable differences in policy design and institutional commitment, with Canada demonstrating a more systematic integration of digital literacy, the Philippines emphasizing access and equity, and Indonesia facing challenges related to resource disparities and curriculum consistency. These variations illustrate how national contexts influence the inclusiveness and effectiveness of digital literacy policies. The study concludes with recommendations for policymakers to design context-sensitive, equitable, and future-oriented digital literacy strategies that align with labor market demands and promote sustainable economic growth.*

Keywords: Comparative Education Policy; Decent Work Economic Growth ; Digital Literacy; High School Education; Public Policy

Abstrak. Literasi digital telah menjadi fondasi utama bagi inovasi pendidikan dan partisipasi ekonomi di abad ke-21. Seiring dengan transisi ekonomi global menuju digitalisasi, integrasi kompetensi digital ke dalam kurikulum sekolah menengah atas semakin dipandang penting untuk mendukung Tujuan Pembangunan Berkelanjutan 8 (SDG 8), yang menekankan pekerjaan layak dan pertumbuhan ekonomi inklusif. Studi ini menyelidiki peran kebijakan publik dalam membentuk pendidikan literasi digital di sekolah menengah atas melalui studi kasus komparatif Indonesia, Filipina, dan Kanada. Dengan menggunakan analisis kebijakan kualitatif, penelitian ini mengeksplorasi bagaimana kerangka kebijakan masing-masing negara mengonseptualisasikan, mengimplementasikan, dan mengevaluasi inisiatif literasi digital. Analisis ini berfokus pada integrasi kurikulum, alokasi sumber daya, dan keterlibatan pemangku kepentingan, sekaligus mengkaji bagaimana program-program ini berkontribusi terhadap kemampuan kerja dan ketahanan ekonomi. Temuan ini mengungkapkan perbedaan yang signifikan dalam desain kebijakan dan komitmen kelembagaan, dengan Kanada menunjukkan integrasi literasi digital yang lebih sistematis, Filipina menekankan akses dan kesetaraan, sementara Indonesia menghadapi tantangan terkait disparitas sumber daya dan konsistensi kurikulum. Variasi ini menggambarkan bagaimana konteks nasional memengaruhi inklusivitas dan efektivitas kebijakan literasi digital. Studi ini diakhiri dengan rekomendasi bagi para pembuat kebijakan untuk merancang strategi literasi digital yang peka terhadap konteks, berkeadilan, dan berorientasi masa depan yang selaras dengan tuntutan pasar tenaga kerja dan mendorong pertumbuhan ekonomi berkelanjutan.

Kata Kunci: Kebijakan Pendidikan Komparatif; Kebijakan Publik; Pekerjaan Layak; Literasi Digital; Pendidikan Sekolah Menengah Atas; Pertumbuhan Ekonomi

1. INTRODUCTION

In the evolving landscape of 21st-century education, **digital literacy** has become a cornerstone for developing both academic competence and workforce readiness. Far from being limited to basic computer use, digital literacy now encompasses a broad spectrum of skills, including **information literacy**, **media literacy**, **communication**, **critical thinking**, and **problem-solving**—all essential for navigating an increasingly digital society [1];[2];[3]. As such, digital literacy has transformed from a supplementary skillset to a **core competency** for students and educators alike, enabling them to access and evaluate information, collaborate in digital environments, and create content across various platforms [4];[2].

The integration of digital literacy into secondary education is not merely a pedagogical enhancement; it is a **policy imperative**. When embedded thoughtfully into public education systems, digital literacy fosters more **interactive**, **collaborative**, and **contextualized learning experiences**, better preparing students to adapt to rapid technological change [5]. At the same time, its integration contributes to **youth employability**, a vital component of **Sustainable Development Goal 8 (SDG 8)**, which emphasizes decent work and inclusive economic growth.

However, realizing the potential of digital literacy on a global scale is constrained by enduring challenges. These include **digital divides** between rural and urban areas, **unequal access to technological infrastructure**, and **growing cybersecurity threats**, all of which limit the equitable implementation of digital education policies [1];[5]. Moreover, the COVID-19 pandemic and the advent of the **Fourth Industrial Revolution (IR 4.0)** have accelerated the demand for digital competencies while simultaneously exposing gaps in readiness across education systems [6].

This paper argues that **public policy** plays a pivotal role in addressing these challenges by shaping comprehensive, inclusive, and future-oriented digital literacy frameworks. By comparing policy approaches in different national contexts—namely **Indonesia**, **the Philippines**, and a **high-performing digital education system**—this study explores how governments can leverage education policy to build digital competencies that directly contribute to **decent work opportunities and economic resilience**. The analysis seeks to identify **best practices**, **policy gaps**, and **contextual enablers** that influence the success of digital literacy initiatives at the secondary education level.

2. LITERATURE REVIEW

The Expanding Concept of Digital Literacy in Secondary Education

Digital literacy in secondary education has evolved from its early association with basic technological proficiency to encompass a broader set of **complex cognitive, motor, sociological, and emotional skills** [7]. It now includes the ability to critically assess information, communicate across platforms, manage digital identities, and navigate socio-ethical aspects of technology use. Roberts Radičuks et al. (2025) identify **eight conceptual dimensions** of digital literacy: **digital tools**, **ethics**, **pedagogy**, **information management**, **cognitive**, **emotional**, **social**, and **individual** domains—revealing significant definitional diversity across educational contexts [8].

Empirical studies show that **secondary school students** often display high proficiency in mobile device usage and online communication, yet exhibit weaker skills in areas such as **cybersecurity awareness**, **content creation**, and **virus prevention** [9]. Notably, there is **no significant gender gap**, although proficiency levels vary across schools and regions, reflecting the persistent **digital divide**.

In terms of pedagogy, the integration of **Digital Literacy Theory**, **21st Century Skills**, and the **TPACK framework** (Technological Pedagogical Content Knowledge) has been shown to enhance digital competencies when embedded within project-based and context-aware learning environments [10]. These approaches emphasize **collaborative learning**, **critical thinking**, and **problem-solving**—skills deemed essential for preparing students for the future of work.

The Role of Teachers and Institutional Capacity

Teachers remain central to the success of digital literacy programs in schools. As **facilitators**, **ethics guides**, and **technology mediators**, they are tasked with not only delivering content but also shaping students' responsible and critical use of digital tools [11]. Despite this critical role, many educators demonstrate only **intermediate-level digital literacy** and often lack access to adequate **professional development**, **infrastructure**, and **institutional support** [12]. This gap underscores the urgent need for **capacity-building programs** that empower teachers to adopt **innovative digital pedagogies**.

Moreover, sustained and meaningful integration of technology in classrooms requires a **multi-stakeholder approach**, involving collaboration between teachers, school administrators, policymakers, and the private sector [13];[14]. Without this alignment, digital literacy risks being fragmented, performative, or ineffectively implemented.

Public Policy Approaches to Digital Literacy

At the policy level, digital literacy has become a strategic concern for governments seeking to enhance human capital and bridge socio-economic divides. However, research highlights a **tension between high-level policy aspirations and ground-level teaching practices**, often due to vague policy definitions and misalignment with pedagogical realities [15]. To address this, **meso-level frameworks** such as **Problem-Based Learning (PBL)** have been proposed to translate abstract digital literacy goals into practical classroom strategies.

The concept of **digital literacy itself has expanded** to include **digital policy literacy**—an understanding of legal and ethical issues such as **copyright**, **privacy**, **data protection**, and **platform governance** [16]. These components are increasingly critical in preparing students to navigate not only digital environments but also the broader **socio-political context of technology**.

Public institutions, especially **libraries**, have emerged as key intermediaries in the **implementation of digital literacy policy**. Libraries provide community-based digital access, training programs, and support services, particularly for marginalized groups [17];[18]. Their advocacy role also contributes to the creation of inclusive and responsive policy frameworks [19];[20].

Global Perspectives and Contradictions in Policy Implementation

Internationally, countries like **Singapore** and the **United Arab Emirates** have demonstrated how national digital literacy policies can **catalyze socio-economic transformation** through well-funded, centralized strategies that link education with innovation and workforce development [21]. These examples underscore the potential of digital literacy policies to drive **social innovation** and contribute directly to **economic growth**—a key component of SDG 8.

Yet, scholars caution against overly technocratic visions of digital literacy. Sefton-Green et al. (2009) argue that the concept is not politically neutral; rather, it reflects **competing ideologies, exclusions, and contradictions**, especially when filtered through **school policies**, **media discourse**, and **youth cultural practices** [22]. Without careful attention to context and equity, digital literacy policies risk reproducing existing inequalities under the guise of modernization.

Table 1. Summary of Key Theme

Theme	Key Insights	Key References
Definitional Complexity	8-category model; beyond technical skills	Eshet-Alkalai (2004), Roberts Radičuks et al. (2025)
Student & Teacher Readiness	Skill gaps, uneven access, training needs	Jan (2018), Sherly Rahmawati et al. (2024), Desniyanti (2025)
Pedagogical Frameworks	TPACK, PBL, Digital Literacy Theory	Arbiana Putri et al. (2025), Ryberg & Georgsen (2010)
Policy-Practice Gap	Tension between policy and teaching	Shade (2012), Ryberg & Georgsen (2010)
Global & Institutional Roles	Libraries, international best practices	Sharma et al. (2023), Jaeger et al. (2012), Whiteside et al. (2022)
Critical Perspectives	Power, exclusion, ideological tensions	Sefton-Green et al. (2009)

As summarized in **Table 1**, the literature on digital literacy reveals a multidimensional and contested field shaped by both **global frameworks and local implementation dynamics**. The interplay between **policy aspirations**, **pedagogical realities**, and **institutional capacities** underscores the importance of contextually grounded approaches. While models such as TPACK and problem-based learning offer pedagogical pathways, structural challenges—such as **uneven access**, **teacher training gaps**, and **policy-practice disconnects**—continue to hinder equitable implementation. Furthermore, the inclusion of **critical perspectives** reminds us that digital literacy is not just a set of technical or cognitive skills, but a **political and ethical endeavor**. These themes set the foundation for the following **comparative case studies**, where we examine how three national education systems have navigated these complexities through their public policy approaches to digital literacy in senior high schools.

3. METHODOLOGY

This study adopts a **comparative qualitative research design** to analyze public policy approaches to digital literacy in senior high schools across three national contexts: **Indonesia**, **the Philippines**, and **Canada**. The aim is to examine how different education systems conceptualize, implement, and evaluate digital literacy policies, and how these relate to the goals of **decent work and economic growth** as articulated in **Sustainable Development Goal 8 (SDG 8)**.

Research Design

The research utilizes a **qualitative document analysis** (QDA) approach, which is well-suited for interpreting educational policy texts and frameworks across countries (Bowen, 2009). This method enables the identification of patterns, themes, and contradictions in policy language, objectives, implementation mechanisms, and stakeholder roles.

The study is informed by the **comparative education research tradition**, which emphasizes cross-national policy learning and context-sensitive analysis [23]. To deepen the policy analysis, the study applies **Ball's Policy Cycle Framework** (1994), focusing on the stages of **policy formulation**, **policy interpretation**, and **policy enactment** within institutional and classroom settings [24].

Case Selection

The three countries were selected based on variation in digital literacy policy maturity and regional diversity: a.) **Indonesia** represents a developing Southeast Asian context with an emerging digital education agenda,b.) **The Philippines** provides a parallel Southeast Asian case with a strong policy push on ICT integration through DepEd,c.) **Canada** offers a Global North example with advanced policy infrastructure and decentralized educational governance, allowing comparative insight into policy implementation across provinces.

This **purposeful sampling** strategy allows for **maximum variation** [25], highlighting diverse approaches and challenges in digital literacy integration.

Data Collection

Data sources include: a.) National education policy documents, digital literacy frameworks, and curriculum guides,b.) Official publications and white papers from Ministries of Education and related agencies, c.) Reports from international organizations (e.g., UNESCO, OECD) d.)Academic literature and case studies relevant to each country.

Additionally, **semi-structured expert interviews** (n=6) will be conducted with education policymakers, curriculum developers, and senior high school educators from the selected countries. These interviews will provide contextual interpretations of policy and practice alignment.

Analytical Framework

The data will be analyzed thematically using **NVivo 14** for coding and categorizing recurring themes across three dimensions: a.) **Policy Intentions** (goals, discourse, definitions), b.) **Policy Instruments** (curriculum integration, training programs, stakeholder roles),c.) **Policy Outcomes** (measured or inferred impacts on student digital literacy and employability) This is complemented by **Ryan & Bernard's (2003)** coding strategies for inductive and deductive theme development, enabling a balance between theory-driven and data-driven analysis [26].

Ethical Considerations

The study adheres to ethical research standards including: a.) Informed consent for all interview participants,b.) Anonymity and confidentiality in reporting,c.) Transparent sourcing and citation of public documents

Country Case Studies

Indonesia

Indonesia has made significant strides in integrating digital literacy into its national education agenda, especially with the launch of **Kurikulum Merdeka** (Independent Curriculum), which encourages schools to contextualize learning and emphasizes digital skills as a transversal competence. The Ministry of Education, Culture, Research, and Technology (Kemendikbudristek) has promoted various **digital platforms** such as Rumah Belajar and the Learning Management System (LMS) **SEVIMA EdLink** to support online and blended learning.

Despite these initiatives, research suggests that the **implementation remains uneven**, particularly between urban and rural areas, due to disparities in infrastructure and digital access [5]. Teachers, while central to the process, often display **intermediate digital competence** and face challenges such as inadequate training and outdated hardware [12];[11]. Integrating frameworks such as **TPACK** and **Digital Literacy Theory** has been recommended to support teacher capacity building and improve pedagogical integration [10].

Moreover, digital literacy programs in Indonesia have largely emphasized **technical use and platform navigation**, with less attention to **digital ethics**, **cybersecurity**, and **policy literacy**, leaving students vulnerable to online threats and misinformation [9]. This gap underscores the need for **policy refinement** that expands digital literacy definitions and aligns

classroom practices with the broader goals of SDG 8, including **workforce adaptability and economic resilience**.

The Philippines

The Philippines has long recognized the importance of ICT in education, as evidenced by the Department of Education's (DepEd) **ICT Curriculum Framework** and its **Digital Rise Program**. Senior High School (SHS) curricula under the **K to 12 Basic Education Program** include specialized ICT strands that directly address employability and skills development for the digital economy.

A unique aspect of the Philippine approach is its engagement with **higher education institutions** and private-sector actors, such as the **Mariners' Polytechnic Colleges Foundation**, which offer **vocational-aligned ICT programs** that combine digital skills with maritime industry needs. These partnerships help bridge the gap between education and labor markets.

However, national-level policies often remain **aspirational**, facing implementation challenges due to **unequal access**, **teacher training deficits**, and **regional variation** in school capacities [5];[12]. As in Indonesia, teachers in the Philippines play a multifaceted role as **facilitators, ethics guides, and mediators of digital knowledge** [11], but many still lack access to **structured capacity-building programs**.

Research by Hague & Payton (2011) and Csiszárik-Kocsir & Berényi (2023) emphasizes the importance of **multi-stakeholder collaboration** in digital education. This insight is particularly relevant for the Philippines, where effective policy implementation often depends on coordination between **DepEd**, **LGUs (Local Government Units)**, and **school administrators** [13];[14]. Yet, digital policy discourse in the Philippines sometimes overlooks deeper issues such as **youth digital rights**, **privacy**, and **critical media literacy**, which are essential in framing digital literacy as a **right and a responsibility**, not merely a technical skill.

Canada

Canada offers a compelling contrast as a Global North country with **decentralized educational governance** and robust integration of **digital competencies** into provincial curricula. Provinces like **Ontario** and **British Columbia** have developed **comprehensive digital literacy standards**, incorporating not only technical fluency but also **digital citizenship**, **policy literacy**, and **socio-emotional skills**—addressing domains identified by Roberts Radičuks et al. (2025)[8].

The Canadian education system emphasizes **problem-based learning (PBL)** and **project-based pedagogies**, aligning with meso-level frameworks proposed by Ryberg & Georgsen (2010)[15]. Public institutions, especially **libraries**, play a central role in supporting **community-based digital inclusion**, offering training, access, and policy advocacy (Jaeger et al., 2012; Visser, 2013; Whiteside et al., 2022) [17];[18];[20].

Moreover, Canadian public policy reflects a broader conceptualization of digital literacy that includes **ethical awareness**, **data privacy**, and **intellectual property** education [16]. This reflects a **post-digital** understanding of literacy where **critical consciousness** and **civic engagement** are integral.

Canada's policy coherence, combined with localized implementation and strong **public infrastructure**, has allowed digital literacy education to contribute meaningfully to **youth employability**, **social inclusion**, and **economic innovation**—directly supporting SDG 8 [21].

Table 2. Summary Comparison Table

Dimension	Indonesia	Philippines	Canada
Policy Type	Centralized, curriculum-driven	Centralized, with localized partnerships	Decentralized (provincial-led)
Teacher Readiness	Intermediate, undertrained	Variable, undertrained	Highly trained, with structured PD
Digital Literacy Scope	Narrow (technical)	Moderate (technical + some ethical)	Broad (technical, ethical, policy)
Stakeholder Role	Government-led	Multi-sectoral (DepEd, HEIs, LGUs)	Community & institution-based
Infrastructure	Uneven	Uneven	Strong, public-supported
Alignment with SDG 8	Moderate	Moderate	Strong

As shown in **Table 2**, the three countries demonstrate **divergent approaches** to digital literacy policy shaped by their governance structures, institutional capacities, and educational priorities. While **Indonesia** and the **Philippines** operate within more centralized systems with uneven infrastructure and undertrained teachers, they are gradually incorporating digital literacy through curriculum reforms and cross-sectoral collaborations. In contrast, **Canada's decentralized, well-resourced approach**—anchored in community institutions and comprehensive teacher training—allows for a broader conceptualization of digital literacy that includes ethical, civic, and policy dimensions. These cross-national differences reveal not only **variation in digital readiness**, but also the extent to which each system aligns digital literacy with the broader aspirations of **SDG 8**. The comparative insights provide a valuable foundation for identifying **best practices**, **policy gaps**, and **context-sensitive innovations**, which are explored further in the following section.

Comparative Analysis

The comparative analysis of Indonesia, the Philippines, and Canada reveals distinct patterns in how public policy operationalizes digital literacy within senior high school education. By examining key dimensions such as **policy design**, **pedagogical integration**, **stakeholder involvement**, and **alignment with workforce development**, we can identify both **shared challenges** and **context-specific strengths**.

Policy Centralization vs. Decentralization

A fundamental difference lies in the **structure of educational governance**. Indonesia and the Philippines adopt centralized policymaking models, where national ministries dictate curricular content and digital priorities. However, in practice, **local variability and implementation gaps** persist, especially in under-resourced regions [5]. Canada's **decentralized model**, by contrast, allows provincial governments to tailor digital literacy initiatives to local contexts, resulting in more **responsive and coherent integration** of digital competencies into education [23].

Despite their structural differences, all three countries face the challenge of translating high-level digital literacy objectives into **classroom practice**—a gap widely recognized in the literature [15];[16]. Canada mitigates this gap through **meso-level strategies**, including project-based learning and province-specific curriculum guides, while Indonesia and the Philippines often rely on **broad national directives** without sufficient pedagogical scaffolding.

Scope and Depth of Digital Literacy

The **breadth of digital literacy** embedded in education policy also varies significantly. Indonesia tends to emphasize **technical competencies**—such as the use of digital platforms and basic applications—while ethical, legal, and civic dimensions remain underdeveloped [9];[11]. The Philippines has made some progress toward a more balanced model, incorporating communication and collaboration skills, but lacks consistent national implementation [12].

Canada, however, embraces a **holistic framework** that includes **digital ethics, data privacy, intellectual property**, and critical media literacy [16];[8]. This comprehensive approach aligns more closely with contemporary demands for **digital citizenship** and reflects a forward-thinking orientation toward the digital economy.

Teacher Capacity and Professional Development

Teachers play a pivotal role in translating policy into practice, and their **digital preparedness** directly influences the success of policy implementation. While all three contexts recognize the need for teacher training, only Canada has institutionalized **structured professional development (PD)** programs that align with curriculum reforms [27];[25]. In contrast, Indonesia and the Philippines continue to struggle with **training deficits**, especially in rural areas, where access to technology and ongoing PD remains limited [11];[10].

Moreover, Canadian teachers are often seen as **co-designers of digital content** and **ethical mentors**, whereas their counterparts in Southeast Asia are frequently positioned as **implementers of top-down mandates**. This distinction influences the degree of **teacher agency** and innovation in integrating digital literacy across subjects.

Stakeholder Collaboration and Institutional Roles

The **degree of stakeholder engagement** also differentiates these systems. Canada benefits from a robust network of **public libraries, community organizations, and provincial agencies**, which play a direct role in digital inclusion and education [17];[20]. These actors serve as both service providers and policy advocates.

In the Philippines, collaboration between **DepEd**, **higher education institutions**, and **local governments** (LGUs) provides a promising model of **multi-sectoral partnership**, though it often depends on local initiative rather than systemic policy. In Indonesia, the government remains the primary driver, with **limited horizontal collaboration** across sectors—limiting innovation and localized responsiveness.

Contribution to SDG 8: Decent Work and Economic Growth

The **alignment of digital literacy policies with SDG 8** is strongest in Canada, where digital education is explicitly linked to **workforce development, economic innovation, and social inclusion**. By integrating **career-relevant digital skills**, Canada positions digital literacy not just as an educational goal but as a **strategic economic asset** [21].

Indonesia and the Philippines show **moderate alignment**, often viewing digital literacy as an **educational modernization effort** rather than a workforce imperative. While vocational ICT tracks exist, they tend to be narrow in scope and disconnected from broader **labor market strategies**. Both countries would benefit from more **explicit linkage between education policy and employment pathways**, especially in rural and underserved areas.

Overall, the comparative analysis suggests that **policy coherence**, **stakeholder alignment**, and **teacher capacity** are key enablers of effective digital literacy integration. Canada demonstrates how a **broad definition of digital literacy**, supported by **institutional collaboration** and **context-responsive policy**, can drive outcomes aligned with SDG 8. In contrast, **Indonesia and the Philippines** illustrate the complexities of implementing digital reform within **resource-constrained and centralized systems**, where gaps in **capacity**, **infrastructure**, and **inter-agency coordination** persist.

4. DISCUSSION

Contextualizing Digital Literacy within Broader Policy Landscapes

The findings of this study underscore that the effectiveness of digital literacy policies is inseparable from the **broader socio-economic, institutional, and technological context** in which they are implemented. While global frameworks like SDG 8 provide valuable direction, their realization is profoundly shaped by **national capacities, governance structures, and historical development trajectories**.

Context Matters: Beyond Policy Adoption

Research consistently confirms that **contextual factors**—including infrastructure, teacher capacity, curriculum culture, and institutional support—play a **critical role** in shaping digital literacy outcomes [28]. For example, while Canadian provinces benefit from stable infrastructure and localized governance, enabling context-responsive strategies, Indonesia and the Philippines struggle with **infrastructure gaps and centralized policy bottlenecks**, which restrict adaptive implementation at the school level.

However, context is not a fixed variable. As Zhang (2023) notes, while background factors like **teacher gender or experience** may not directly predict digital literacy success, **attitudes toward technology, access to devices, and digital competencies** remain pivotal [29]. These insights caution against simplistic assumptions that **policy uniformity guarantees equity**. Instead, digital literacy efforts must be tailored to diverse **school ecologies**, **teacher profiles**, and **student communities** [30];[31].

Policy Learning from Adjacent Sectors: Innovation, Environment, and Health

Policy lessons from other sectors offer valuable analogies for digital literacy development. For instance, **fossil fuel-rich developing countries**, as studied by Manley et al. (2017), face challenges adapting to climate policies due to structural dependencies and limited

diversification—paralleling how education systems reliant on traditional methods may struggle to integrate digital approaches [32].

Similarly, the work of **Gu (1999)** and **Islam (2005)** on **National Innovation Systems** and **new growth theories** suggests that **policy coherence**, **knowledge flows**, and **technological diffusion** are essential to long-term human capital development. In digital literacy terms, this reinforces the importance of **policy environments** that support **continuous learning**, **teacher innovation**, and **technology access** [33];[34].

Just as **technology diffusion for climate solutions** requires decades of investment and behavior change (Blackman, 1999), scaling digital literacy requires **patient policy**, focused on **human capital development**, **information dissemination**, and **institutional adaptation** [35]. This aligns with Traxler's (2012) observation that **mobile contexts** introduce complexity into digital literacy strategies, demanding greater flexibility in frameworks and tools [36].

Digital Literacy as a Foundation for Broader Transitions

Digital literacy must be understood not as an isolated educational priority but as **infrastructure for transition** across sectors—economic, environmental, health, and social. As highlighted by **Glewwe (2013)**, education remains one of the most powerful levers for economic development, yet policy knowledge remains fragmented [37]. Similar gaps exist in health (Mosley et al., 1993) and fisheries (Bostock et al., 2004), suggesting the need for **policy synthesis** that connects education with other national priorities [38].

In this light, digital literacy becomes a **transversal capacity**—one that enables economic participation, supports adaptive governance, and fosters citizen engagement in an era of digital transformation. For countries like Indonesia and the Philippines, whose development pathways are influenced by global trade, environmental pressures, and demographic transitions, digital literacy is a **strategic necessity** for both economic growth and social resilience.

Reconciling Tensions: Modernization vs. Equity

The analysis also brings into focus the **ideological tensions** embedded in digital literacy policies. As Sefton-Green et al. (2009) argue, literacy policy is never politically neutral—it reflects **ideologies of inclusion, exclusion, and modernization**. For instance, the push toward digital tools in education may inadvertently widen inequalities when **access and agency** are unevenly distributed [22].

Addressing these tensions requires **multi-level policymaking** that aligns national goals with classroom realities and includes **feedback loops** between teachers, learners, and policymakers. Investing in **teacher identity formation**, **mobile learning frameworks**, and **local content development** is essential to ensure that digital literacy policies are not just technologically ambitious but also **culturally and contextually grounded** [30];[36].

The discussion highlights that effective digital literacy policy is not merely a matter of curricular reform or infrastructure deployment. It demands **context-sensitive, cross-sectoral strategies** rooted in national innovation systems, guided by long-term growth thinking, and attuned to the social dynamics of education. As developing countries navigate a complex global environment—characterized by climate risk, economic restructuring, and technological acceleration—digital literacy emerges as both a **response to and a driver of transformation**.

5. CONCLUSION

This study has explored how public policy approaches to **digital literacy in senior high schools** contribute to the broader agenda of **decent work and economic growth (SDG 8)**, using a comparative analysis of Indonesia, the Philippines, and Canada. The findings reveal that while digital literacy is increasingly recognized as a **core 21st-century competency**, the pathways to its integration remain **highly context-dependent**, shaped by governance models, institutional capacity, pedagogical frameworks, and stakeholder engagement.

Canada's decentralized, well-resourced, and ethically grounded approach provides a model for comprehensive digital literacy policy—one that aligns education, labor market readiness, and civic participation. In contrast, Indonesia and the Philippines, despite significant policy efforts, continue to face structural and implementation barriers, including **infrastructure gaps**, **teacher training deficits**, and **limited inter-sectoral collaboration**.

Across all cases, the analysis underscores that **digital literacy is not just a technical goal**, but a **strategic lever for inclusive development**. Effective policies must go beyond curriculum reform to address the social, ethical, and economic dimensions of digital engagement. This includes strengthening **teacher agency**, fostering **local innovation ecosystems**, and ensuring **equitable access** to digital tools and learning environments.

As the global economy becomes increasingly digital and interconnected, the ability of education systems to equip youth with **critical, ethical, and adaptive digital skills** will be central to sustainable development. For developing countries especially, digital literacy policy must be integrated into broader strategies for **economic diversification**, **human capital**

development, and **technological resilience**—making it not only an educational imperative but a **national development priority**.

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