

Lifelong Learning in the Digital Age: Addressing Economic and Social Inequalities Through Inclusive Policy

L'Apprentissage Tout Au Long de la Vie à l'Ère du Numérique : Atténuer les Disparités Socio-Économiques par des Politiques Inclusives

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Abstract :

This paper discusses the multiple implications of implementing lifelong learning on a large scale in today's societies. Highlighting its importance for empowering individuals, building communities, and fueling the economy, the research examines systemic obstacles ranging from economic to social to technological. At a microeconomic level, participation in lifelong learning is related to the trade-off between costs (tuition fees, opportunity costs, and time) and benefits (increased employability and enhanced wages). The experience of most people shows that wage returns justify the investment in some cases; however, on the whole, social and economic inequality impedes some individuals and preserves social inequality for others. At the macroeconomic level, lifelong learning drives economic growth, innovation, and social resilience, but the high social costs, particularly in terms of public spending and infrastructure development, present fiscal challenges. One of the main barriers is finance, reflecting ongoing debates about the sources of funding—public sector, private sector, and individuals—indicating differential access and equity. In addition, systemic inequality is exacerbated by the digital divide, which restricts access for the most marginalized to digitally mediated learning programs. Rapid digital transformation and the adoption of artificial intelligence (AI) add further complexity to this palette, opening up opportunities for democratization as well as the potential for further deepening social divides. Disadvantaged individuals with low digital literacy skills and/or poor digital infrastructure may be left behind, increasing social stratification. To address this, the article argues for the adoption of broad policy actions that advance inclusive access, equitable financing, and investment in digital infrastructure. The comparative strategy of case studies across Singapore's SkillsFuture and the US free online platforms seeks to highlight the mechanics of how equitable lifelong learning systems can be developed to keep pace with technological changes and to recommend potential policy designs to support the formulation of sustainable and inclusive educational systems, especially in developing countries like Morocco.

Keywords : Lifelong Learning, Human Capital skills, Digital technologies, Artificial Intelligence.

JEL Classification: I24

Paper type : Empirical Research

Résumé :

Cet article explore les défis et les opportunités associés à la mise en œuvre à grande échelle de l'apprentissage tout au long de la vie dans les sociétés contemporaines. En soulignant son rôle crucial dans l'autonomisation des individus, la cohésion sociale et le développement économique, l'étude analyse les barrières systémiques touchant les domaines économiques, sociaux et technologiques. À l'échelle microéconomique, la participation à l'apprentissage tout au long de la vie est influencée par l'équilibre entre les coûts — tels que les frais de scolarité, les coûts d'opportunité et le temps — et les bénéfices, comme l'amélioration de l'employabilité des salariés. Les résultats empiriques indiquent que, si les retours sur investissement peuvent justifier certains efforts, les inégalités socio-économiques limitent souvent l'accès pour les groupes défavorisés, renforçant ainsi la stratification sociale. À l'échelle macroéconomique, l'apprentissage tout au long de la vie contribue à la croissance économique, à l'innovation et à la résilience sociétale ; cependant, des coûts sociaux importants, tels que les dépenses publiques et les investissements dans les infrastructures, posent des défis fiscaux. Un obstacle central réside dans la question du financement, avec des débats sur les sources de financement — gouvernement, secteur privé ou individus — soulignant les disparités en matière d'accès et d'équité. De plus, les inégalités systémiques sont exacerbées par l'accès à la technologie numérique, qui limite la participation des populations marginalisées. Le développement rapide des technologies numériques et de l'intelligence artificielle (IA) complique davantage ce paysage, offrant à la fois des opportunités de démocratisation et des risques d'aggravation des inégalités. Les groupes marginalisés ayant une faible littératie numérique ou peu d'infrastructures risquent l'exclusion, ce qui pourrait accentuer la stratification sociale. Pour répondre à ces enjeux, l'article préconise des mesures politiques globales favorisant un accès inclusif, un financement équitable et des investissements dans les infrastructures numériques. À travers une étude de cas comparative du programme SkillsFuture de Singapour et des plateformes d'apprentissage en ligne gratuites aux États-Unis, l'étude vise à identifier des stratégies efficaces pour favoriser des systèmes d'apprentissage tout au long de la vie équitables, capables de s'adapter aux changements technologiques, afin d'éclairer les décideurs politiques et les acteurs publics, notamment dans les pays en voie de développement comme le Maroc, sur la création de cadres éducatifs durables et accessibles.

Mots clés : Apprentissage tout au long de la vie, développement du capital humain, technologies numériques, intelligence artificielle.

Classification JEL : I24

Type du papier : Recherche empirique

1. Introduction

Lifelong learning has become an essential catalyst for personal and societal empowerment and an engine of economic development in today's world. Internationally renowned as a key enabler of driving innovation, competitiveness, and resilience, it highlights the need for lifelong learning outside of formal education. However, despite its acknowledged importance, the broad dissemination of lifelong learning presents a constellation of challenges that are economic, social, and technological in nature. This complexity calls for a sophisticated perspective on the systemic obstacles and potentials in its formation.

From a microeconomic perspective, the sustainability of lifelong learning depends on a fragile trade-off between costs (tuition fees, opportunity costs, time) and benefits (primarily in terms of better employment and wage opportunities). Research has indicated (Van Leeuwen & van Praag, 2002) that potential wage increases encourage participation; however, the financial cost disproportionately deters individuals from lower socio-economic statuses and, as a result, deepens socio-economic disparities. Similarly, the evidence in Dorsett, Lui, and Weale (2010) indicates that, in the UK, people who invest in lifelong learning often receive wage returns that can pay for the costs upfront, though with the important caveats that returns are regressive regarding initial skills and access to quality education. This, in turn, exacerbates economic inequity, and only select social groups can participate equitably in this process.

At the macroeconomic level, lifelong learning brings wider social benefits, including increased economic growth, innovation, and greater social cohesion. Investments in human capital resulting from these types of programs also have long-term effects, making the workforce more flexible and competitive. Researchers such as Md Shariff et al. (2017) consider it one of the best investments because it can yield long-term macroeconomic dividends (in terms of GDP growth and labor market flexibility). However, the advantages are contrasted with the economic costs that arise in society and are mainly associated with subsidies, infrastructure, and digital resources. Van Leeuwen and van Praag (2002) warn about the long-term obligations against the backdrop of long repayment periods and complicated fiscal implications.

The financial aspect is the cornerstone of the generalization of lifelong learning. Such controversies persist, as well as discussions about the financial model of support, whether from individuals' contributions, the state, or private enterprises. Md Shariff et al. (2017) stress that individual initiatives could create barriers to access for economically disadvantaged communities and would reproduce social disparities. On the other hand, heavy public investment calls for large amounts of financial resources, which are usually limited due to political considerations and budget constraints. Private sector participation is critical but often oriented toward short-term profit rather than long-term benefits for society, making it even more challenging to build sustainable lifelong learning systems. Systemic inequities are further exacerbated by the digital divide, as underserved populations lacking access to cutting-edge technology or digital literacy are excluded from digitally-based training programs that are increasingly at the core of today's lifelong learning strategies.

The speed of digital development and AI technology amplifies systemic risk and inequality. While digital tools and AI applications offer the potential to democratize access to education, they may also exacerbate existing inequities if historically marginalized groups are unable to achieve digital literacy or acquire the necessary infrastructure. Patrinos (2003) cautions that the divisions between the knowledge haves and have-nots may serve to maintain social inequities, hampering the advancement of entire communities. Therefore, solving these systemic problems demands integrated policy measures that provide equal access, fair mechanisms of funding, and capacities for digital infrastructure.

In order to overcome these challenges, the empirical part of the paper undertakes a comparison of the national program SkillsFuture in Singapore—a top-down, national project—and the phenomenon of FOLPs (Free Online Learning Platforms) in the United States—privately led and lacking a clear national policy. The study seeks, through in-depth explorations of the models' concepts, realization, stakeholder involvement, and consequences, to gather insights into how to promote inclusive lifelong learning in a changing world. By acknowledging systemic factors which include unequal funding, digital divides, and socio-economic disparities, this research highlights the need for comprehensive policy requirements that reconcile economic sustainability with social justice. Its ultimate purpose is to provide policy-makers, educators, and other stakeholders with information on which to base sustainable and inclusive lifelong learning systems to meet the challenges of a rapidly digitalizing and globalizing world.

2. Literature review

2.1. The economics of lifelong learning

Lifelong learning is the ongoing, voluntary, and self-motivated pursuit of knowledge for either personal or professional reasons (Field, 2012). It focuses on the need to respond to economic, social, and technological changes, as well as the ongoing professional requirements to enhance personal development, employability, and social cohesion. It is widely believed that lifelong learning is founded on a flexible and learner-centered approach that considers the autonomy of the learner and reflective practice. This idea embodies the belief that all learning occurs throughout an individual's lifetime and that formal classroom learning is merely one part of a broader purpose for education, to enable individuals to adapt to changes in life and work (Jarvis, 2009).

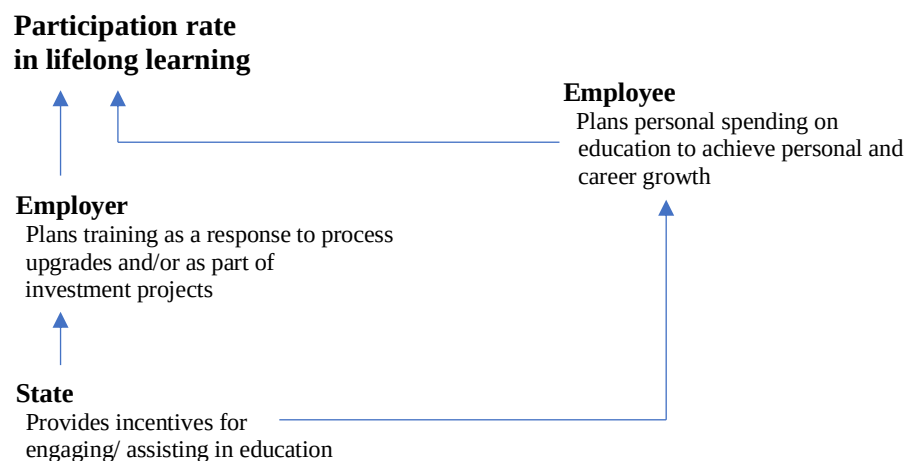
The concept of lifelong learning is based on several main theories. Experiential learning (Kolb, 1984) emphasizes learning through concrete experiences and reflective activity. Andragogy (Knowles, 1980) stresses the unique attributes of adult learners, such as self-direction and experience, as influencing practices in adult education. Transformative learning (Mezirow, 1991) refers to critical reflection that results in the changing of one's frame of reference or worldview, which may then generate changes for the individual or society. Taken together, these theories emphasize that lifelong learning is an active, self-determined, and reflective endeavor that is necessary for responding to one's changing life circumstances and encouraging ongoing individual and professional development (Field, 2012).

From an economic point of view, lifelong learning presents extensive advantages at many levels. For individuals, it is essential from the perspective of work, employability, market value, self-updating, and adaptation to current technological changes, as well as to dynamic job demands and requirements. Lifelong learning is also utilized to foster necessary abilities, such as technical skills and soft skills that could easily be transferred, such as critical thinking, adaptability, creativity, and communication (Sevgi & Koc, n.d.). Participating in lifelong learning can enhance satisfaction in personal and professional life, financial well-being, and overall quality of life (Olcott, 2022). For employers, lifelong learning means access to a competent, flexible, and productive labor force, which is necessary to ensure competitiveness and innovation in the economy, especially in a knowledge-based economy (Korshunov & Gaponova, 2017). At the national level, for instance, lifelong learning adds value to economic development, productivity, and resilience, creating a ready and motivated workforce that fosters innovation and addresses the issue of unemployment. It also enhances the level of tax collection and reduces the challenges of dependency created by an aging population (Oosterbeek & Patrinos, 2009). The positive externalities of lifelong learning extend beyond strictly economic benefits and also include social aspects such as social cohesion, civic

participation, and quality of life (Thwe & Kálmán, 2023). Instilling such principles in education through lifelong learning can contribute to sustainability objectives (Vrdoljak, 2024).

The economics of lifelong learning is daunting, not least because of the cost. While education is typically considered a private good, state regulation of the market is known to serve as an effective tool to facilitate the emergence of lifelong learners (Oosterbeek & Patrinos, 2009). On a personal level, financial barriers can manifest as tuition fees, due to the fact that many adult education organizations are poorly financed (Korshunov and Gaponova, 2017). Different mechanisms have been explored to stimulate participation through various financing principles, such as scholarships, grants, tax incentives, learning vouchers, and individual learning accounts (Oosterbeek & Patrinos, 2009). They suggest that by reallocating accumulated resources from a lifetime's earnings, there could be a greater capacity to facilitate lifelong learning for a larger segment of the population (Vrdoljak, 2024). Indirect costs, working conditions, and the management of work and family life also present major barriers (Thwe & Kálmán, 2023).

Figure 1: Interaction among the major stakeholders in the labor market as a foundation of lifelong learning systems



Source : Korshunov, I., & Gaponova, O. (2017). Lifelong learning in the context of economic development and government effectiveness.

A key aspect of the economics of lifelong learning is social justice. Yet, the perennial learning divide applies, with less of a showing among the poor. Some of these deficit trajectories begin early and can persist over generations. Apart from the obvious disparities in economic terms and the digital divide, there is also inequality related to gender that affects the inclination toward lifelong learning and the differing impact on employability for women and men (Hinze, 2006). Territorial inequality similarly affects access, as well as benefits in learning (Bynner, 2017). Generational factors create specific policy requirements for young adults and highlight the importance of family learning in closing educational divides between generations. In order to achieve fairness, these complex dimensions of inequality need to be acknowledged and addressed.

One of the main tasks of the economics of lifelong learning is to stimulate equal access to all levels of education, facilitate the integration of permanently noncompetitive cohorts, and bridge inappropriate skill gaps (Korshunov & Gaponova, 2017). Lifelong learning is an area that can potentially offer new social opportunities for people in situations where the level of education was insufficient in the past (Bynner, 2017). It is viewed as part of the struggle against social exclusion and growing inequality (Sevgi & Koc, n.d.). However, an ongoing problem is that some sectors are less engaged in learning than others. It has been stated that it is important to provide equal availability of basic skills and opportunities at various levels, which would

prevent the formation of functional illiteracy and help to overcome the learning divide (Korshunov & Gaponova, 2017). An emphasis on the bottom line in economic terms only can distract from the larger equity picture.

In summary, the economics of lifelong learning involve a set of complicated dynamics surrounding individual, employer, and societal gains, as well as considerable costs and enduring struggles regarding equity and finance. Reaching the maximum potential of lifelong learning requires balancing increased economic growth and competitiveness with the crucial aims of social inclusion and equity. Cooperation among all stakeholders—workers, employers, government, and educational institutions—is fundamental to achieving these goals (Molnár et al., 2024).

2.2. Policies frameworks for lifelong learning

Lifelong learning has been widely recognized as a key emergent organizing principle for education in the 21st century, particularly vital for developing countries as they seek to address the demands of the global knowledge economy. The discussion of lifelong learning and its policy implications worldwide has been significantly influenced by international organizations, including UNESCO, OECD, European Commission, and World Bank. Such institutions promote lifelong learning as a concept of learning for all of life (from early childhood to retirement), which is inclusive of formal, non-formal, and informal education settings (Regmi, 2015). On one hand, some perspectives emphasize the human capital model, focusing on economic development, employability, and competitiveness; on the other hand, a humanistic model is based on social inclusion, citizenship education, self-development, and equality (Vargas, 2017).

The development of lifelong learning policy is not without special challenges that developing countries face. At the same time, they confront the dual challenge of overcoming traditional issues of access, quality, and equity in basic education systems while simultaneously advancing toward lifelong learning as a comprehensive framework (Vargas, 2014). Some of the main challenges include the “multiplicity of conceptions, lack of operationalization tools, scale dimensions, and complexities related to governance and financing” (Panitsidou, Griva, & Chostelidou, 2012). Conventional educational metrics may fail to capture the range of learning across different settings. Additionally, the flexibility of educational institutions to address the diverse needs of learners may be limited.

Despite these limitations, the policy orientations proposed by international organizations can be adapted by developing countries, and there are valuable lessons to be learned from the experiences of other nations. A major point for action is to create mechanisms that recognize learning occurring outside of formal education systems, encompassing non-formal and informal learning (Kumar, 2019). This is especially important where access to formal institutions is restricted. Strengthening existing systems is also crucial, including through teacher training and the use of information and communication technologies (ICT) (Regmi, 2015). There is general consensus that lifelong learning strategies of this nature depend on policy coordination within and among ministries and institutional actors that extend beyond the realm of education alone (OECD, 1997). This means adopting flexible policy and regulatory systems rather than imposing rigid measures. It is essential to rethink financing mechanisms, proposing investigations into models that would de-incentivize investment in human capital over the lifecycle, which may involve a mix of financial support for learners or potentially loan mechanisms enabling learners to cover the costs according to their income, thereby improving motivation (World Bank, 2002).

3. Method

3.1. Methodological approach

The method used in this article is a comparative case study, which seeks to compare and contrast two different models of lifelong learning: the initiative in Singapore (SkillsFuture) and the trend in the USA (Free Online Learning Platforms - FOLPs). The choice of Singapore and the USA as comparative cases is based on the fact that both share features of global tech leaders, advanced digital economies, and educational innovation front-runners. Their contrasting models—Singapore’s centralized, state-determined approach versus the USA’s decentralized, market-driven approach—illustrate how leadership and economic prowess in technology manifest in education when planning for workforce needs. We dissect these models to discover the levers available for the scalable integration of digital fluency and the equitable development of learning skills, which provide guidelines for worldwide usable frameworks to create adaptive, future-oriented learning ecosystems. This methodological decision aligns with the purpose of the paper, which is to gain insights into what different system approaches consider regarding the challenges and opportunities for lifelong learning in the context of technological advancements, digitalisation, and economic growth.

The comparative case study approach is ideally suited for studying complex social problems across various settings, providing an opportunity to thoroughly analyze the design, implementation, and outcomes of each program. The paper analytically deconstructs the individual cases, outlining their main features, intended audiences, strategies, and stakeholder engagement. For SkillsFuture, the focus is on a labor movement that is led and coordinated by the government, which offers financial incentives (SkillsFuture Credit), cooperation from industries, and clear pathways to enhance the workforce’s continuous learning. In contrast, the US online platforms can be described as private-led, decentralized, and global in reach, highlighting open access, self-paced learning, and industry participation for relevance.

3.2. Data collection and processing

The data is largely qualitative and secondary, based on reports, program overviews, and academic reviews. The study draws from official program documents, policy analyses, and empirical research to provide comprehensive profiles of each approach. This permits a nuanced analysis of their strategic priorities, target populations, fundraising models, and use of technology. Basing the analysis on secondary data provides a broad and holistic understanding, but it also requires interpretation to avoid subjective biases or omissions.

The comparative study is organized according to thematic aspects, such as target groups, strategies, stakeholder communication, and technical integration. This thematic categorization allows for a systematic comparison of the strengths, weaknesses, and potential for scaling up/adapting each model. Quantitative information is not specified but is alluded to via the program's reach (number of courses, financial assistance, etc.) and impact indicators (employability outcomes and industry relevance). Additionally, the approach takes a contextual view of systemic barriers hindering lifelong learning, such as cost barriers, financial accessibility, digital divides, as well as economic inequalities and a lack of skills.

In general, the approach emphasizes a comparative, qualitative case study perspective founded on secondary data sources, thematic analysis, and contextual understanding. Such a view allows this research to develop a nuanced understanding of how various policy and technological interventions might support lifelong learning in the face of rapid technological change and social inequalities. It provides a strong basis for better comprehension of the pros and cons of national versus privately led models and offers significant perspectives for

policymakers, educators, and stakeholders designing inclusive and effective lifelong learning systems.

4. Results

Driven by rapid technological change, globalization, and the rise of artificial intelligence (AI) and digital innovation, lifelong learning has become an integral part of the country's economic strategy. Governments and corporations around the world are investing in models to support ongoing learning in the workplace. This paper provides a comparative analysis of two leading examples: the government-driven SkillsFuture Initiative in Singapore and the free online learning platforms (FOLPs) in the United States. The objective is to assess how effective they are at addressing skills demands, particularly in AI and high-tech fields, as well as their respective obstacles and impact.

4.1. SkillsFuture Initiative: Promoting Lifelong Learning and Skills Development in Singapore

SkillsFuture is Singapore's national program (since August 2015) that provides students and workers with opportunities to develop their full potential throughout their lives, regardless of their starting points. The objective of the project is to develop people's capabilities to succeed in an economy undergoing rapid transformation due to technological innovations such as artificial intelligence, data analysis, and digital manufacturing. This initiative is based on the SkillsFuture Credit, where those aged 25 years and above receive SGD 500 (approximately \$385) to help pay for accredited courses, effectively lowering the cost of learning. Building on this Skills Framework, which is a coordinated and up-to-date directory of skills covering at least 80 industries connected to emerging skills, it reflects skills in demand and serves as a facilitator for individuals to change industries and move into new positions.

SkillsFuture works closely with employers, incentivizing them through grants and wage support to conduct workplace training and invest in employees. The program also promotes cooperation among public and private training providers, making modular programs, certifications, and career pathways more accessible. Together, these elements enhance jobseekers' employability and job mobility, while also contributing to industry transformation and enabling Singapore's workforce to remain agile and relevant in a globalized economy. In its entirety, SkillsFuture represents what it means to take a whole-of-society, multi-actor national approach to skills and lifelong learning.

4.2. Free Online Learning Platforms in the United States: Transforming Global Education

In recent years, the United States has driven an educational revolution of sorts with the spread of FOLPs—Coursera, edX, Khan Academy, and Udacity among them. These platforms democratized access to a quality education by providing Massive Open Online Courses (MOOCs) in partnership with renowned universities and tech companies. A key aspect is that they are open to all: courses are usually free or inexpensive and available to learners in every country, on topics that range from AI to machine learning to data science. Flexible and self-paced, these platforms allow learners to customize their education to fit their personal agendas by promoting lifelong learning. In addition, many FOLPs offer certification, micro-credentials, and immediate access to formal university degrees, thus providing greater opportunities for employment and career advancement. Industry partnerships are central to this, with companies like Google and IBM co-designing curricula in response to market demand, ensuring that the skills students learn are up to date and fit for purpose. These programs have greatly mitigated educational barriers, enabling free access and the continuous nurturing of skills. As such, these free online learning platforms have emerged as critical enablers of creating a more accessible,

dynamic, and industry-driven global education system through the innovative use of technology to transform lifelong learning and workforce preparedness in the 21st century.

4.3. Comparative Analysis

SkillsFuture for Singapore is a national program uniting the community and education providers with the mission of enhancing the employability of all Singaporeans, particularly working adults. In comparison, US online platforms are privately driven, decentralized, and offer a wide range of flexible courses worldwide. Although SkillsFuture focuses on a strategic alignment with the industry, US platforms provide a variety of choices, and this flexibility is more applicable for a broader international audience in need of upskilling opportunities (see Table 1).

Table 1: Focus and Approach

Aspect	Singapore's SkillsFuture	US Online Platforms
Target Audience	All Singaporeans, especially working adults and mid-career professionals	Global audience, primarily working adults and students seeking flexible upskilling
Main Strategy	Government-led, comprehensive national program with credits, structured pathways, and industry collaborations	Private-led, decentralized, offering open access to courses aligned with industry needs
Curriculum Focus	Industry-relevant, future-ready skills, including AI, digital transformation, and advanced manufacturing	Broad, including AI, data analysis, programming, but varying in industry alignment

Source: Authors

Table 2: Similarities between the learning models

Aspect	Singapore's SkillsFuture	US Online Platforms
Similarities	Enhancing workforce adaptability and address skills gaps.	
	Emphasizing digital skills development, particularly in AI and high-tech domains.	
	Fostering lifelong learning as a continuous process, not limited to initial education.	
	Crucial role of Partnership : Singapore with industry and educational institutions; US platforms with universities and corporations.	

Source: Authors

Table 2 highlights common aspects in both Singaporean and US online platform policies, thus accentuating the role of digital technology in democratizing lifelong learning. The success of both proposals lies in the emphasis on partnership and overcoming structural challenges, such as funding and digital divides, emphasizing the necessity for inclusive and flexible policies to enable equitable access in an expanding technological future.

Table 3: Differences between the learning models

Aspect	Singapore's SkillsFuture	US Online Platforms
Governance	Centralized, state-driven	Decentralized, market-driven
Funding	Public funding through government credits and grants	Primarily private, with some public partnerships; courses are often free or low-cost
Credentialing	Formal certifications recognized nationally; pathways to formal qualifications	Certificates, micro-credentials, and potential credit transfer; recognition varies by employer
Participation	High engagement among working adults due to structured incentives	Voluntary participation; engagement varies widely among demographics
Customization	Industry-specific skills maps and pathways	Open access, wide variety but less tailored to national industry needs

Source: Authors

Table 3 identifies some critical distinctions between Singapore's SkillsFuture and U.S. online learning initiatives, particularly in terms of governing frameworks and financing models, as

well as their realization paths. These differences pertain to policy design, technology integration, and stakeholder engagement, emphasizing the need for contextual modifications toward effective lifelong learning systems.

This case illustrates two different results and issues regarding two Core Models of Lifelong Learning — the SkillsFuture initiative and online learning platforms in terms of their response to AI skills needs. Singapore’s SkillsFuture is an example of a centralized, government-driven effort to cultivate a nation of lifelong learners, particularly in new areas such as AI and digital manufacturing. Highlights include its structured paths and industry-aligned curricula combined with substantial public investment, which have led to high enrollments and tangible progression: 72% of participants report an advancement. Furthermore, provisions to encourage broad participation, such as subsidies, have contributed to widespread involvement, even among non-technical specialists.

By contrast, U.S. online platforms such as Coursera, edX, and Udacity function in a decentralized, market-based model, providing public access to a wide range of courses for millions of students across the globe. Such platforms are both highly scalable and adaptive, continually offering refreshed material that includes up-to-the-minute AI breakthroughs, as is the case for curricula incorporating Generative AI courses launched in 2023. They have attracted millions of learners to their programs, evidenced by 1.2 million enrollments in AI-related courses back in 2022, when there was already a significant appetite for a less rigid form of skills development. However, these platforms face considerable challenges, such as low completion rates of only 15% and issues of access, particularly for the rural or underprivileged segments of the population. Furthermore, micro-credentials are not always well recognized by employers, which may restrict their influence on career advancement.

Table 4: Outcomes of the learning models (AI courses, 2023)

Metric	SkillsFuture	U.S. Platforms
Annual Participants	540,000	25 million (U.S.)
Course Completion Rate	68%	15%
AI-Related Enrollments	85,000	1.2 million

Source: Coursera, SkillsFuture SG, Annual Report 2023

Meeting an AI skills shortage poses different challenges for each model. Singapore’s philosophy benefits from aligning closely with the national economic blueprint, with inclusiveness and systematic workforce transformation being key. Its programmatic tracks and intentional accreditation systems yield quantifiable results. Meanwhile, U.S. platforms perform well in terms of innovation and global representation but face issues regarding recognition, equity, and participation of diverse communities. The differences in completion rates clearly indicate a call for more focused interventions aimed at equitability and motivation.

Finally, both models have made significant contributions to the development of AI skills; however, due to their drawbacks, there is a case for a hybrid model. Such a merging of Singapore’s coordinated, inclusive approach with what U.S. online platforms have achieved in terms of pervasiveness and programmability could further optimize AI skills training to be widely available, formally recognized, and aligned with national and global industry needs. This integration would address the complex issues of training AI skills in a world that is becoming increasingly digital.

5. Discussion

This comparison demonstrates how structural investments and personal incentives affect lifelong learning, while socio-economic inequality heavily determines the odds of access. Marginalized members confront obstacles such as cost, opportunity trade-offs, and lower returns on education, which reproduce the asymmetrical relationships that exist among them.

In this section, we aim to show how a developing country such as Morocco might envision a lifelong learning system and use the outcomes of this specific case to address challenges that differ within the context of specific social, economic, and structural circumstances. High social stratification, infrastructure deficiencies, and rural-urban divides create a situation in which inequalities are amplified, and marginalized groups are hit hard by costs, low returns on education, and uneven ICT access. As lifelong learning drives economic innovation, Morocco's scant public financing and governance constraints necessitate hybrid financing models and a focused strategy for digital inclusion. A comparison with countries such as Singapore highlights adaptive policies that articulate education and economic agendas and focus on the marginalized. Each of the aforementioned gaps must be filled—mutually reinforcing—through pendulum swings between global frameworks and localized solutions, and through an approach that is tailored and contextualized for Morocco in order for inclusive development via lifelong learning to progress.

5.1. Micro and Macro Aspects of Lifelong Learning

This research shows that the sustainability of lifelong learning lies in an equilibrium of costs and benefits at both micro and macro levels. The participation of individuals from socioeconomically disadvantaged groups is particularly constrained by key barriers, including tuition fees, opportunity costs, and duration. Although wage returns may positively motivate learners to pursue further education, the choice to enter such programs depends on the inequality of potential returns. Such a relationship tends to exacerbate social inequalities. For example, Dorsett et al. (2010) argue that skilled individuals are more likely to extract significant rewards, thereby increasing the polarization of society. On a macroeconomic level, investment in lifelong learning offers the potential for economic development and creativity. However, achieving success requires massive public investment and strategic planning. In emerging countries such as Morocco, these dual perspectives highlight crucial policy issues: how to economically make lifelong learning accessible to all and how to translate investments into effective economic outcomes. The evidence suggests that the potential benefits of lifelong learning may only reach the privileged, who possess the agency or support to utilize new knowledge and pursue their development, thereby reinforcing inequality—an issue that is particularly problematic in a context like Morocco, where there is a high degree of social stratification and limited resources.

5.2. Systemic Problems: Financial models and the digital divide

The systemic challenge of lifelong learning funding is a thread that runs throughout the study. The issue of funding—whether public, private, or direct from individuals—brings advantages and limitations. Public investment may improve equity, but it is constrained by fiscal limitations and political will. Private sector participation might lead to a focus on short-term financial gains rather than social benefits, and dependence on individual contributions risks excluding those on the margins (as seen in both the UK and the US). In low-income countries, the digital divide further exacerbates the situation, posing a serious obstacle to accessibility for all. Patrinos (2003) notes that whenever marginalized individuals, such as the digitally illiterate, are involved in participatory digital learning, major challenges are encountered. While AI and digital tools are becoming increasingly integral to lifelong learning, the digital divide may risk exacerbating inequalities if policy is not deliberately adjusted to close the gaps in access.

5.3. Technology and Digitalization: Opportunities and Threats

The case underscores that the development of new technology—particularly AI and online

platforms—provides an unparalleled opportunity to democratize lifelong learning. FOLPs, such as those in the USA, demonstrate that it is possible to use digital platforms to create open, flexible, and scalable learning that is available globally. However, the digital divide can become a vehicle for entrenching inequalities if investment in universal digital infrastructure and literacy is not prioritized.

For Morocco, deploying digital technology for lifelong learning requires investment in ICT infrastructure, access to low-cost internet, and digital literacy campaigns. Without these, digital platforms fail to be democratic and risk instead being exclusionary, defeating the purpose of education for all throughout life.

5.4. Policies Relevance in Developing Countries : A comparative perspective

For example, a country like Morocco faces specific constraints and opportunities in setting up credible lifelong learning systems. To drive inclusive and sustainable development, countries will need to implement policies that facilitate equitable access, innovative financing, digital integration, and multi-sectoral coordination. An important priority is the promotion of integrated and equitable funding mechanisms. For instance, Morocco could mobilize diverse sources of funding, including public investment, private sector participation, and innovative mechanisms such as social impact bonds or public-private partnerships (OECD, 2018). It can focus on the most vulnerable and marginalized populations, such as women, rural dwellers, and the poor in general, contributing to the reduction of socio-economic inequalities in access to learning (World Bank, 2020).

Digital infrastructure and literacy development are equally crucial. In a world where digital platforms are central to education and skills development, developing country and donor country policies should focus on expanding broadband, establishing community digital centers, and integrating digital literacy into the school curriculum. The digital divide needs to be addressed to ensure that already marginalized populations are not excluded from digital learning and, in turn, left behind in a 21st-century economy (ITU, 2021). Morocco can learn from global examples, such as Singapore's SkillsFuture program, which emphasizes digital skills, long-term planning, and cooperation with industry to create an adaptable workforce (SkillsFuture Singapore, 2022).

Strategic stewardship and multisectoral coordination are the backbone of successful lifelong learning policies. Some countries, such as Finland, exemplify systemic coordination from early childhood through adult and non-formal education, including arrangements for the recognition of prior learning and pathways for lifelong learning (OECD, 2017). Morocco may harmonize such models by developing national skill formation strategies aligned with economic priorities and establishing mechanisms for cooperation among government entities, industry, and educational providers (Vargas, 2014).

In addition, targeted interventions are needed to address socio-economic disparities. Flexibility in learning modalities—such as part-time, distance, and media-based education—can accommodate diverse needs. Pedagogical shifts towards active, learner-centered approaches, as seen in Guatemala, may further enhance engagement and outcomes (Vargas, 2014). International references, such as Chile's recognition of prior learning systems supported by the World Bank, highlight the importance of validating non-formal and informal skills (World Bank, 2018). Demand-side financing mechanisms, including scholarships and conditional cash transfers, have increased participation in countries like Bangladesh and Guatemala (Regmi, 2015).

Finally, low- and middle-income countries like Morocco need to adapt global best practices to their context to build inclusive, digital, and resilient lifelong learning systems. Focusing on system-wide coordination, innovative financing, and culturally relevant content will be crucial for fostering social and economic development (Kumar, 2019).

6. Conclusion

The paper presents an analysis of the multilayered aspects of lifelong learning, with particular attention to its crucial importance for individuals' empowerment, societal integration, and economic development during a time of fast technological transformation, digital revolution, and innovations and their implementation. Its findings are extremely topical as AI and digital tools change the nature of education and work, especially in developing countries, such as Morocco.

At the research level, this study stresses the need to weigh the costs and benefits across micro and macroeconomic scales. Although lifelong learning can make a beneficial difference in personal employability and wage rates, a range of access barriers—including financial, social, and digital divides—too often prevent equitable access. There is empirical evidence that many marginalized groups, especially those without digital literacy and infrastructure, are at risk of being left further behind in this age of digital transformation. This emphasizes the importance of inclusive policies that redress inequalities of access and financing, so that the gains from lifelong learning are more universally distributed.

The literature review provided in this paper situates lifelong learning within the broader imperative of economic resilience and innovation. It shows that investment in people can be essential in creating a workforce that is agile, competitive, and able to keep pace with changes in technology. However, such large-scale implementation carries fiscal difficulties, citing high social and fiscal costs for both infrastructure provision and public expenditure. This complexity requires nuanced policy responses that leverage both the public and private sectors, focusing on equitable funding models and targeted investments in digital infrastructure.

In addressing the main research question, the paper calls for a portfolio of policy measures that emphasize inclusion, the improvement of digital literacy, and sustainable financing models. Drawing on comparative research, such as Singapore's SkillsFuture program and U.S. online platforms, the research outlines strategic options for creating equitable lifelong learning systems. These models illustrate how forward-thinking government initiatives and innovative digital services can help bridge the gap and make lifelong learning more accessible to all.

Moreover, the implications of these findings for development strategy in EMDCs, such as Morocco, are significant. The Moroccan case, marked by major social disparities, requires tailored actions to bridge, rather than exacerbate, gaps through digital solutions, as infrastructure remains a major obstacle. Measures to extend digital infrastructure, subsidize access for disadvantaged groups, and promote local digital literacy initiatives are fundamental. Furthermore, developing public-private partnerships and seeking various funding sources can help reduce the financial burden, thus enabling lifelong learning ecosystems to grow sustainably.

In summary, this research provides insights into how AI and digital technology innovation can motivate the development of more inclusive and efficient lifelong learning systems, especially in emerging countries. It highlights the importance of addressing systemic inequities and investing in digital infrastructure to fully harness the potential of lifelong learning as a catalyst for economic progress and social inclusiveness. The findings offer a useful reference for Moroccan policymakers in formulating effective, universally governed, and sustainable educational policies in accordance with contemporary technological developments. Supporting the creation of a lifelong learning model allows our societies to be resilient in the face of the accelerating pace of digital change, contributing significantly to broader development ambitions and social cohesion.

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