CHAPTER 2
INNOVATIONS IN THE MANAGEMENT OF EDUCATIONAL INSTITUTIONS

A COMPARATIVE ANALYSIS OF THE DIGITAL COMPETENCIES DEVELOPMENT IN ADULT EDUCATION

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Citation:
Spivak, I., Mihus, I., & Greben, S. (2024). A COMPARATIVE ANALYSIS OF THE DIGITAL COMPETENCIES DEVELOPMENT IN ADULT EDUCATION. *Pedagogy and Education Management Review*, (2(16), 18–27. https://doi.org/10.36690/2733-2039-2024-2-18-27

Received: May 21, 2024
Approved: June 27, 2024
Published: June 30, 2024

Abstract. *In the context of an increasingly digitalized global economy, the integration of digital skills into adult education has become a crucial determinant of socio-economic mobility and inclusivity. Digital literacy serves as a foundational element for employment, social engagement, and access to essential services, making it imperative for adults to continuously adapt to technological advancements. This article aims to explore the critical need for embedding digital skills in adult education frameworks. It seeks to identify the core digital competencies required for effective participation in the digital world, assess the current barriers to digital literacy, and propose actionable strategies to enhance digital learning among adults. The study employs a mixed-methods approach, combining a comprehensive literature review, analysis of multiple international case studies (United States, Singapore, Sweden, Brazil, Estonia), expert interviews, and policy analysis. This methodology provides a broad perspective on the effectiveness of current digital skills programs and insights into best practices across different socio-economic and cultural contexts.The findings reveal that successful digital skills programs are often characterized by robust government support, partnerships with technology firms, tailored learning approaches that address specific demographic needs, and a strong emphasis on practical application. However, challenges such as keeping pace with rapid technological changes, ensuring program scalability, and overcoming socio-economic barriers persist. Recommendations for overcoming these challenges include adopting adaptive learning frameworks, fostering a culture of lifelong learning, enhancing access through improved infrastructure, and closely aligning education programs with market needs.*

Keywords: *digital literacy; adult education; lifelong learning; educational policy; technological competency; digital divide.*

JEL Classification: A 20, O 33, Z 13

Formulas: 0; fig.: 1; tabl.: 1; bibl.: 8

Introduction. In an increasingly digitalized world, the imperative for adults to acquire and refine their digital skills has never been more crucial. As technology continues to reshape the landscape of work, communication, and daily life, the gap between those proficient in digital skills and those who are not is widening. This gap poses significant challenges, not just in terms of individual competency, but also in broader socio-economic inclusion and access to opportunities. This article delves into the pressing need to foster digital literacy within adult education frameworks. It explores the benefits of digital skills, outlines the current barriers to digital education, and presents strategies for integrating effective digital learning into adult education programs. By addressing these critical aspects, the article aims to highlight the transformative potential of digital skills development in empowering adults to navigate and succeed in a digital world.

Literature Review. The necessity of integrating digital skills in adult education is supported by a robust body of literature, which underscores the transformative role of technology in modern societies and economies. This review explores thematic insights from a selection of scholarly articles, books, and empirical studies that collectively illustrate the critical dimensions of digital literacy in adult learning.

Van Deursen and Van Dijk (2019) examine the direct correlation between digital skills and employability, emphasizing that lacking digital proficiency is a significant barrier to job market entry and career advancement. Helsper and Eynon (2021) explore the nuanced interplay between digital skills and socio-economic status, arguing that enhanced digital literacy can lead to greater socio-economic mobility. Selwyn (2018) provides an analysis of the systemic and institutional barriers that hinder the incorporation of digital education in adult learning environments, such as funding shortages, outdated curriculum models, and resistance to change. Reder and Bynner (2020) focus on longitudinal studies showing the long-term impacts of inadequate digital skills on adults' life trajectories, highlighting the urgent need for tailored educational programs. Kersh and Huegler (2019) discuss various models of adult education that integrate digital learning effectively, emphasizing collaborative and problem-based learning approaches that cater to adult learners' unique needs. Law, Jelfs, and Nguyen (2022) analyze case studies from several countries that have successfully implemented digital skills programs in adult education, offering insights into best practices and program design. Warschauer (2018) investigates how digital literacy extends beyond functional skill acquisition, contributing to broader social inclusion and active citizenship. Ryberg and Larsen (2021) present findings on the empowerment that comes from digital literacy, particularly for marginalized communities, enhancing their participation in digital-centric societies.

Aims. The primary aim of this article is to elucidate the critical importance of integrating digital skills into adult education programs and to explore effective strategies for fostering digital literacy among adult learners. This will contribute to bridging the digital divide and enhancing socio-economic opportunities for adults.

To achieve this aim, the article sets forth several specific objectives:

1. *Identify the Core Digital Skills Needed in Today's Economy*: Establish a comprehensive list of essential digital skills that adults need to participate effectively in the digital world.

2. *Evaluate Current Barriers to Digital Literacy in Adult Education*: Analyze the existing challenges that impede the integration of digital skills in adult learning environments, including institutional, technological, and socio-economic barriers.

3. *Highlight Successful Models of Digital Skills Integration*: Review case studies and examples of successful digital literacy programs within adult education, drawing insights into effective practices and program design.

4. *Recommend Policies and Practices*: Propose actionable recommendations for policymakers, educators, and stakeholders to enhance the effectiveness of digital skill development in adult education settings.

Methodology. The methodology for this article encompasses a mixed-methods approach designed to provide a comprehensive analysis of the need for digital skills in adult education:

– to conduct a thorough review of existing literature, including peer-reviewed journals, books, and credible online sources that discuss digital literacy, adult education, and related policies. This will help in understanding the broader context and identifying gaps in the current research;
– utilize a qualitative method by examining multiple case studies that showcase successful implementation of digital skills in adult education programs worldwide. This will provide practical insights and highlight transferable strategies;
– analyze current policies and frameworks governing adult education and digital literacy to identify enabling factors and barriers that influence the effectiveness of digital skills training;
– based on the findings from the literature review, case studies, interviews, and policy analysis, develop a set of detailed recommendations tailored to different stakeholders involved in adult education.

This methodological framework will ensure that the article is grounded in empirical evidence while also drawing on the practical experiences of educators and policymakers in the field. It aims to provide a holistic view of the challenges and opportunities in integrating digital skills into adult education.

Results. The integration of digital skills into adult education has become a crucial element in ensuring that individuals remain competitive in a rapidly evolving job market. This comparative analysis explores several case studies from different parts of the world, evaluating the approaches, outcomes, and lessons learned from each. The cases considered include programs from the United States, Singapore, Sweden, and Brazil, each offering unique insights into effective digital education strategies for adults.

1. United States: Broadband Technology Opportunities Program (BTOP). Funded by the U.S. government, BTOP was designed to improve access to digital technology for Americans, particularly in underserved communities. The program included training in basic digital skills, internet use, and safe online practices, provided through public libraries and community centers. BTOP successfully increased digital

literacy across diverse populations, including older adults, low-income families, and rural residents. Post-program surveys indicated significant improvements in participants' ability to use digital tools for employment, education, and civic engagement. The importance of accessibility was a key takeaway, emphasizing the need for digital education programs to be accessible in familiar, local environments such as libraries.

2. Singapore: SkillsFuture Initiative. Singapore's SkillsFuture Initiative targets all aspects of lifelong learning but has a strong emphasis on adult education, particularly in enhancing digital skills. The program offers subsidies and a variety of courses tailored to different skill levels, focusing on both basic and advanced technological competencies. The initiative has been highly successful in encouraging continuous learning and skills development among adults, leading to better job performance and more robust career development pathways. Flexibility and adaptability in course offerings, along with substantial government backing in terms of funding, were crucial to the program's success.

3. Sweden: Digital Senior Project. The Digital Senior project in Sweden focuses on enhancing the digital skills of the elderly, facilitating their engagement with modern technology through tailored workshops that include internet safety, social media, and digital communication tools. Participants reported increased confidence in using technology, which significantly improved their social inclusion and access to online services. Peer learning and social inclusion are effective strategies in motivating older adults to learn and adopt new digital skills.

4. Brazil: Cisco Networking Academy. In partnership with local institutions, Cisco Networking Academy offers extensive training in IT skills and career-building courses. In Brazil, the focus has been on not only providing these skills but also ensuring that underserved communities have access to these educational resources. The program has successfully prepared thousands of Brazilians for IT careers, with many participants moving on to advanced studies or directly entering the tech industry. Industry partnerships can provide the practical skills and direct pathways to employment that are often missing in more traditional adult education programs.

5. e-Estonia Digital Training Programs for Adults. The e-Estonia Digital Training Programs are designed to ensure that all citizens are equipped with the necessary digital skills to navigate the digital-first society. The programs are often free and available online, covering a wide range of topics from basic digital literacy to advanced programming and cybersecurity. These initiatives are supported by public-private partnerships, leveraging resources from tech companies and educational institutions. The outcomes have been overwhelmingly positive, with a significant percentage of the adult population becoming more proficient in digital skills. This has led to increased employment opportunities in the tech sector and beyond, as well as greater civic engagement through digital platforms. A key lesson from the e-Estonia programs is the importance of accessibility and relevance. Offering programs online and free of charge removes barriers to entry for many adults who might not otherwise have the means or opportunity to participate. Moreover, keeping the curriculum aligned

with current technological trends ensures that the skills acquired are immediately applicable.

The global economy's increasing digitalization necessitates robust digital skills training in adult education programs. This comparative analysis explores how different countries – specifically the United States, Singapore, Sweden, Brazil, and Estonia – have successfully implemented digital skills into their adult education frameworks (Table 1).

Table 1. Successful experiences and Challenges of different countries in implementing digital skills in their adult education system

Approach and Implementation	Key Successes	Challenges
United States		
The United States has leveraged community colleges and public libraries as primary venues for adult education, particularly for digital literacy. Programs often focus on job readiness, with a significant emphasis on digital skills necessary for the modern workplace, such as basic computer literacy, digital communication tools, and internet navigation skills	**Partnerships with Technology Companies**: Many programs succeed through partnerships with tech companies (e.g., Google, Microsoft) which provide both funding and technical resources. **Diverse and Inclusive Curriculum**: Tailored programs for various demographics, including older adults and immigrants, which boost inclusivity.	**Scale and Accessibility**: While many localized programs are successful, nationwide scalability remains a challenge, particularly in rural areas
Singapore		
Singapore's SkillsFuture initiative is a national movement aimed at providing Singaporeans with the resources to develop digital skills throughout their lives, with a strong emphasis on adult education. This includes funding for skills courses and an integrated approach involving schools, universities, and private institutions	**Government Support and Funding**: Strong backing by the government ensures that programs are well-funded and aligned with national economic goals. **High Engagement Levels**: High levels of engagement and participation due to comprehensive outreach and public awareness campaigns.	**Rapid Pace of Change**: Keeping curricula up-to-date with rapidly changing technology is an ongoing challenge
Sweden		
Sweden's adult education programs are deeply integrated with its social welfare systems, focusing on lifelong learning. Digital skills training is often provided free of charge, emphasizing both basic skills for everyday life and more advanced skills for professional development.	**Lifelong Learning**: A cultural emphasis on lifelong learning encourages continuous skill development. **Integration with Public Services**: Digital training is often integrated with other public services, making it accessible and practical.	**Language Barriers**: For immigrants, language barriers can complicate access to digital education
Brazil		
In Brazil, digital skills programs in adult education often target underserved populations. Initiatives frequently focus on both foundational skills, like using the internet safely and effectively, and more specific professional skills aligned with local economic needs.	**Focus on Underserved Communities**: Programs often boost socio-economic mobility by providing critical skills to those who need them most. **Community-Based Approaches**: Localized programs that understand and cater to the specific needs of the community.	**Economic Constraints**: Limited funding can affect the quality and reach of programs
Estonia		
Estonia, a leader in e-government services, extends its digital-first approach to adult education. The country offers a comprehensive range of programs that cover basic to advanced digital skills, heavily promoting the idea of a "digital society"	**Government Integration**: Seamless integration with e-government services encourages adults to develop digital skills out of necessity and convenience. **Innovative Learning Methods**: Use of online platforms and e-learning tools that make learning flexible and accessible.	**Keeping Pace with Innovations**: As a leader in digital services, the challenge is to keep educational programs as advanced as the services provided by the government

Each of these countries offers unique insights into diverse strategies and outcomes, providing valuable lessons on effective practices and potential challenges.

These case studies reveal that successful digital skills programs in adult education hinge on government support, adaptability to local needs, and effective public-private partnerships. Each country presents a model adaptable to different contexts, suggesting that a blend of these approaches could benefit other nations aiming to enhance their adult education programs. The main challenge consistently observed across these examples is the rapid pace of technological change, requiring ongoing updates to educational content and methods.

Based on the research conducted, the authors systematized the basic skills that adults should possess in the digital economy (Figure 1).

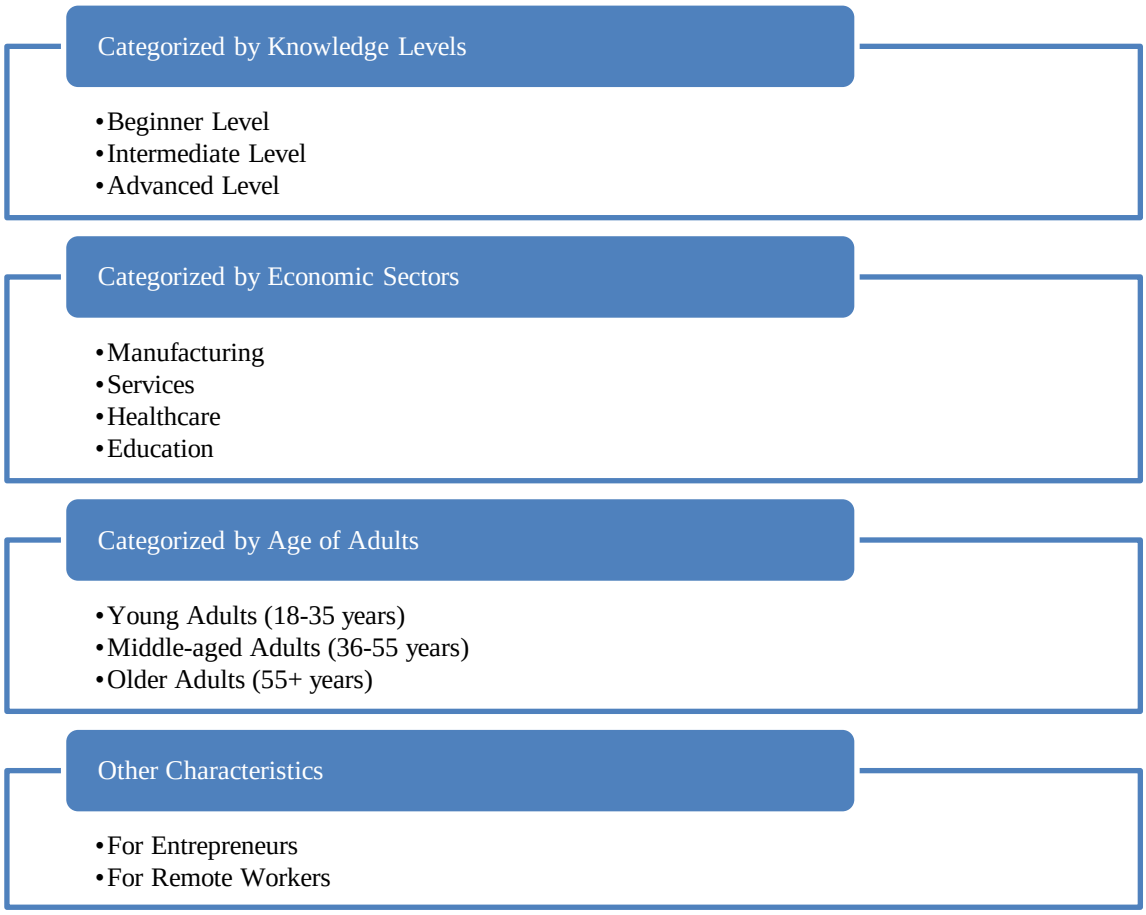

Figure 1. The basic skills that adults should possess in the digital economy

These skills are organized by various characteristics, including knowledge levels, economic sectors, and age groups, to provide a comprehensive framework tailored to diverse needs and contexts:

1. Categorized by Knowledge Levels

Beginner Level:

– *Basic Computer Operation*: Understanding how to operate computers or devices, including starting and shutting down, using interfaces, and managing files and folders.

– *Internet Navigation*: Searching information online, understanding browser functions, and navigating websites.
– *Email Communication*: Sending, receiving, and organizing emails.
– *Basic Document Creation*: Using word processors and simple text formatting.

Intermediate Level:

– *Social Media Literacy*: Setting up and managing social media profiles, understanding privacy settings, and engaging with content.
– *Online Safety and Security*: Basic knowledge of internet safety, using secure passwords, recognizing secure websites.
– *Spreadsheets and Basic Data Handling*: Creating and formatting spreadsheets, basic formulas.
– *Digital Communication Tools*: Using video conferencing tools, chat apps, and collaboration platforms.

Advanced Level:

– *Advanced Data Management*: Using complex functions in spreadsheets, databases, and data visualization tools.
– *Online Collaboration and Project Management*: Managing projects using digital tools, understanding cloud services.
– *Digital Content Creation*: Basic graphic design, video editing, and content creation for blogs or websites.
– *Cybersecurity Basics*: Understanding antivirus software, firewalls, and basic cybersecurity protocols.

2. Categorized by Economic Sectors

Manufacturing:

– *Machine Operation Software*: Using digital tools to operate machinery.
– *Inventory Management Systems*: Utilizing software for stock tracking and management.
– *Quality Control Analysis*: Using software to monitor quality standards.

Services:

– *Customer Relationship Management* (CRM) Software: Managing customer interactions and data.
– *Point of Sale (POS) Systems*: Using digital systems for transactions.
– *E-commerce Platforms*: Managing online sales and understanding e-commerce ecosystems.

Healthcare:

– *Electronic Health Records* (EHR): Managing patient records digitally.
– *Telemedicine Interfaces*: Using digital platforms for remote medical consultations.

Education:

– *Learning Management Systems* (LMS): Utilizing platforms for creating, managing, and delivering educational courses.
– *Digital Assessment Tools*: Understanding and applying digital tools for student assessment.

3. Categorized by Age of Adults

Young Adults (18-35 years):

– *Digital Networking*: Using digital platforms for career growth and networking.
– *Mobile Technology Proficiency*: Using smartphones and apps effectively for various tasks.

Middle-aged Adults (36-55 years):

– *Transition to Digital Tools*: Adapting from traditional methods to digital-first approaches in the workplace.
– *Online Learning Platforms*: Engaging with continuous learning through online courses.

Older Adults (55+ years):

– *Digital Communication:* Using technology for staying connected with family and community.
– *Online Banking and E-commerce:* Safely engaging in online transactions and managing finances.

4. Other Characteristics

For Entrepreneurs:

– *Digital Marketing Skills:* Understanding SEO, social media marketing, and online advertising.
– *Website Management:* Basics of running and maintaining a website.

For Remote Workers:

– *Time Management Tools:* Using digital tools to manage time and tasks efficiently.
– *Remote Access Software:* Understanding and utilizing software to access work systems from home.

This framework of digital skills provides a structured approach for adult education programs to design curricula that meet the diverse needs of learners based on their specific circumstances and goals. This approach not only enhances individual competencies but also ensures that adults are better equipped to thrive in various economic sectors and throughout different stages of their lives.

Discussion. The integration of digital skills into adult education is a critical endeavor that addresses the dual challenges of an evolving job market and the widening digital divide. As our analysis across multiple case studies – spanning the United States, Singapore, Sweden, Brazil, and Estonia – shows, the successful implementation of digital skills programs is deeply influenced by cultural, economic, and policy factors. This discussion highlights the main findings, examines the challenges, and explores potential strategies for enhancing digital literacy programs worldwide.

One of the most consistent themes across the successful programs in the case studies is significant government involvement. Governments that actively support adult education through funding, policy-making, and public-private partnerships tend to see more comprehensive and sustainable outcomes. Estonia and Singapore, in particular, demonstrate how governmental leadership in digital training can lead to high levels of digital literacy that support broader national goals, such as economic development and e-governance.

The effectiveness of digital skills programs significantly increases when they are tailored to the specific needs of the adult population they serve. In Brazil, for instance, focusing on underserved communities and aligning digital skills training with

immediate economic opportunities has proven effective. Similarly, in Sweden, integrating digital education with social welfare initiatives ensures that learners receive support that extends beyond mere skill acquisition.

A recurrent challenge across all regions is keeping educational content and methods up to date with rapidly evolving technology. This challenge necessitates a flexible curriculum and ongoing professional development for educators, which can strain resources and require continuous investment.

The main strategic implications are:

1. ***Adaptive Learning Frameworks:*** to keep pace with technological advancements, adult education programs must adopt more adaptive learning frameworks that can quickly integrate new technologies and methodologies. This might include modular curricula that can be easily updated or expanded, as well as partnerships with tech firms for insights and resources.
2. ***Lifelong Learning Cultures:*** encouraging a culture of lifelong learning, as seen in Sweden, can help ensure that adult education is not a one-time intervention but a continuous part of an individual's personal and professional development. This approach not only supports individuals but also creates a more adaptable workforce.
3. ***Enhancing Accessibility:*** addressing accessibility issues, particularly in rural or underserved areas as noted in the United States, requires innovative solutions. Online learning platforms and mobile learning tools can bridge some of these gaps, but they require infrastructure investments, such as in broadband internet, which need coordinated efforts between multiple stakeholders.
4. ***Focus on Practical Application:*** programs that emphasize the practical application of digital skills, connecting training directly to job opportunities or daily life applications, tend to be more engaging and successful. This is evident from Singapore's SkillsFuture initiative, which closely aligns skills development with career pathways.

Conclusion. The developing digital skills in adult education is an essential but complex challenge that calls for coordinated efforts between governments, educational institutions, and private sector partners. As technology continues to advance, the flexibility of educational programs and the readiness of adults to engage in lifelong learning will be critical in shaping resilient and competitive economies. The case studies provide valuable lessons that can inform future strategies, ensuring that adult education not only meets current demands but also anticipates future needs in the digital age.

As digital skills become increasingly fundamental to navigating the modern world, adult education programs must evolve to provide learners with the tools needed to succeed. This requires ongoing collaboration among educational institutions, policymakers, and industry leaders to ensure that adult education not only meets the current demands but is also forward-thinking enough to anticipate and adapt to future technological developments.

Author contributions. The authors contributed equally.

Disclosure statement. The authors do not have any conflict of interest.

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