Digital literacy and population ageing: Current trends and future outlook with a case study from Singapore

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Population aging for selected regions, 1950-2100

Years of proportion of population aged 60 to double

Proportion of 65+ people in Asia-Pacific countries
a. Individuals using the Internet: World

2023: 67%


b. % using the Internet by region

Digital Divide at Older Ages

The use of information and communication technology (ICT) has become an integral part of daily life, significantly impacting the way people communicate, work, learn, and enjoy their leisure time (Gustafson et al., 2015; Kim et al., 2020).

ICT benefits older people: access to pivotal information, better healthcare provision, enhanced social interaction, improved cognitive abilities, and more gateways for continuous education (Stellefson et al., 2013; Heo et al., 2015).

Digital divide at older ages: the disparity in access, skills, and utilization of ICT between young and older people (Neves et al., 2013; Sims et al., 2017).

https://unece.org/media/Statistics/news/376424
% using the Internet by age group, United States: 2000-2023


% using the Internet by age group, China: 2021

Source: China Internet Network Information Center (CNNIC) (2023).
Digital Divide: An Evolving Notion

Digital divide is firstly based on **accessibility**, which centers on the affordability and availability of ICT technology, with various indicators such as computer and Internet penetration rates, broadband access rates, mobile phone penetration rates, and Internet use frequencies.

With ICT becoming more economically accessible, more attention are paid on **ICT skills**, encompassing digital and internet literacy and proficiency. These skills could be categorized into operational skills, formal skills, information skills, communication skills, content creation skills, and strategic skills.

With the recent rise of web 2.0 platforms and the proliferation of participatory cultures online, scholars have started to focus on the **engagement of social media** as the key to the digital divide.
Digital Divide in Singapore

The Inclusive Internet Index

Overall Rankings

1. Singapore
2. South Korea
3. United States
4. France
5. United Kingdom
6. New Zealand
7. Spain

How the rankings work

The overall Index score is based on the scores of the Availability, Affordability, Relevance, and Readiness categories.

- **Availability**: The Availability category examines the quality and breadth of available infrastructure required for access and levels of Internet usage.
- **Affordability**: The Affordability category examines the cost of access relative to income and the level of competition in the Internet marketplace.
- **Relevance**: The Relevance category examines the existence and extent of local language content and relevant content.
- **Readiness**: The Readiness category examines the capacity to access the Internet, including skills, cultural acceptance, and supporting policy.
Singapore has a leading position in global digital inclusion rankings: It ranks first in the Digital Inclusion Index, particularly in the “availability” category.
Lifelong Education for Aging Productively (LEAP)

Total Sample 2302 cases of Singaporeans aged 65-80.

Three integral dimensions: Learning, Accessibility, and Utility.

• Learning: Willingness and Learning pathways
• Accessibility: Usage frequency of landlines, mobile phones, smart devices, computers, tablets, and internet
• Utility: Managing finances, medication, education, reading news, entertainment, socializing, and work-related tasks.
A Deeper Digital Divide?

Basic Users (42.1%)
- Family-dependent learning
- Phone-based internet access
- Networking and leisure are main use.

Ideal Users (23.4%)
- Passion in self-learning
- High ICT usage
- Diverse digital utilities

Good Users (22.6%)
- Multiple learning pathways
- Phone-based internet access
- Multiple digital utilities

Traditional Users (12%)
- Low willingness to learn
- Traditional landline
- Only networking
Older age ICT engagement, suggesting a generational divide or diminishing cognitive agility with age

Ethnic Preferences: Malay seniors are more likely to be traditional and Indian seniors show a propensity for advanced ICT use.

Higher socioeconomic status correlate with advanced ICT usage.

Worse mental health is highly related to being traditional users.

Residing with children increases the chance of being basic users, but reduced the chance to be ideal users.

### Table: Variables and ICT Usage

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>Basic</th>
<th>Good</th>
<th>Traditional</th>
<th>Ideal</th>
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<tbody>
<tr>
<td>Gender</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Female</td>
<td>1.022</td>
<td>1.099</td>
<td>1.27</td>
<td>0.522***</td>
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<tr>
<td>Age</td>
<td>-0.22</td>
<td>-0.31</td>
<td>-1.57</td>
<td>-3.60</td>
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<tr>
<td>Race</td>
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<tr>
<td>Malay</td>
<td>1.332</td>
<td>0.126***</td>
<td>1.712**</td>
<td>2.705**</td>
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<tr>
<td>Indian</td>
<td>-1.38</td>
<td>-0.625</td>
<td>-2.02</td>
<td>-2.42</td>
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<tr>
<td>Education</td>
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<tr>
<td>Secondary School/Institute of Technical</td>
<td>0.570***</td>
<td>4.570***</td>
<td>0.333***</td>
<td>2.741***</td>
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<tr>
<td>Junior College/Politechnic and above</td>
<td>-5.64</td>
<td>-3.37</td>
<td>-1.32</td>
<td>-4.38</td>
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<tr>
<td>Income</td>
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<tr>
<td>5000-30 000</td>
<td>0.828*</td>
<td>1.547***</td>
<td>0.821</td>
<td>1.114</td>
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<tr>
<td>&gt;= 30 000</td>
<td>-1.92</td>
<td>-3.33</td>
<td>-1.39</td>
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<td>Marital status</td>
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<td>Married</td>
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<td>1.058</td>
<td>1.032</td>
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<td>Living arrangement</td>
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<td>-0.41</td>
<td>-0.21</td>
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<td>Live with child</td>
<td>1.206**</td>
<td>0.769**</td>
<td>0.891</td>
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<td>MMSE</td>
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<td>Cognitive impairment</td>
<td>0.613***</td>
<td>0.368***</td>
<td>2.841***</td>
<td>0.385**</td>
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<td>ADL scores</td>
<td>0.98</td>
<td>-1.33</td>
<td>-1.63</td>
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<td>Depression</td>
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<td>Depressed</td>
<td>0.877</td>
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<td>1.968***</td>
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<td>Self-reported health scores</td>
<td>0.092</td>
<td>1.007</td>
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<td>Frail scores</td>
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<td>1.002</td>
<td>-0.49</td>
<td>-1.42</td>
<td>-1.76</td>
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<td>Constant</td>
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<td>0.945</td>
<td>-1.99</td>
<td>-1.93</td>
<td>-0.02</td>
<td>-1.45</td>
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<td>Observations</td>
<td>2.248</td>
<td>2.248</td>
<td>2.248</td>
<td>2.248</td>
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<td>Pseudo R-squared</td>
<td>0.0796</td>
<td>0.237</td>
<td>0.193</td>
<td>0.233</td>
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</tbody>
</table>

* z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.01
The role of Family learning

3.22. How do you learn modern information technology (e.g. smartphones and computer)? (Select all that apply)

- 1. Self-taught
- 2. Spouse
- 3. Children
- 4. Grandchildren
- 5. Friend
- 6. Social Worker
- 7. Course/Training
- 8. Never learned

(可多选)
Ministry of Digital Development and Information

Building a Safe and Inclusive Digital Society

**DIGITAL READINESS BLUEPRINT 2018**

**SMART NATION SINGAPORE**

- 100% of population residing in Urban centers
- 5.45 MILLION internet users
- 92% of population residing in Urban centers
- 94% of government services are digital from end to end
- 5.30 MILLION social media users
- 56% of people use multiple government digital services several times per year

**Digital Readiness**

- **DIGITAL ACCESS**
  - Having ready access to affordable, inclusive, and trustworthy infrastructure
- **DIGITAL LITERACY**
  - Having the motivation and skills to use digital technologies with confidence
- **DIGITAL PARTICIPATION**
  - Using technology to achieve a better quality of life (e.g., convenience in day-to-day activities, better social and economic outcomes)
  - Being a positive online influence
THANK YOU!