

COMP 2S01S

Technology Beyond Borders Service Learning
across Cultural, Ethnic and Community Lines

The Digital Divide



From the Intended Learning Outcomes...

- Upon completion of this course, you should be able to:
 - Demonstrate an awareness of the impact of the information/digital divide, and the linkage between social disadvantages and the availability of appropriate technology.
 - Reflect on the relationship between their service learning activities and experiences with the academic content of the subject, in particular the needs of the underprivileged in society and their own discipline and sense of civic responsibility, especially pertaining to use and deployment of technological solutions.



What is the Digital Divide?

- Inequalities between groups, in terms of access to, use of, or knowledge of information and communication technologies
Norris, P. 2001. Digital Divide: Civic Engagement, Information Poverty, and the Internet Worldwide.
- A social issue referring to the differing amount of information between those who have access to the Internet (specially broadband access) and those who do not have access.
(Internet World Stats, <http://www.internetworkstats/links10.htm>, retrieved March 2, 2011)
- The digital divide is most commonly defined as the gap between those individuals and communities that have, and do not have, access to the information technologies that are transforming our lives

Dickard, N, Schneider, D. Edutopia



Putting it more simply...

- The term digital divide refers to the increasing access gap between those who have and those who do not have:
 - access to information and communication technologies;
 - access to content that benefits them socially and economically;
 - skills to take advantage of ICT services;
 - the ability to afford to pay for digital services.



JAN
2023

ESSENTIAL DIGITAL HEADLINES

OVERVIEW OF THE ADOPTION AND USE OF CONNECTED DEVICES AND SERVICES



8.01
BILLION

URBANISATION

57.2%



5.44
BILLION

vs. POPULATION

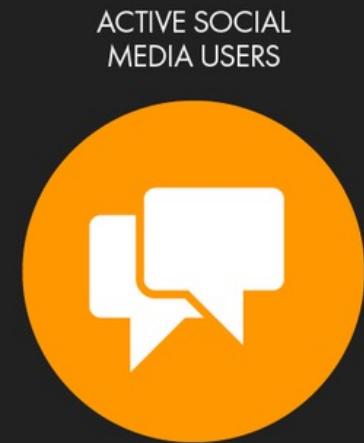
68.0%



5.16
BILLION

vs. POPULATION

64.4%



4.76
BILLION

vs. POPULATION

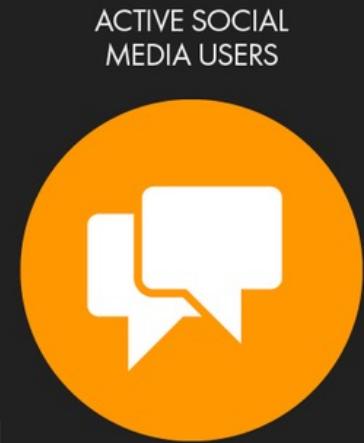
59.4%

SOURCES: UNITED NATIONS; GOVERNMENT BODIES; GSMA INTELLIGENCE; ITU; WORLD BANK; EUROSTAT; CNNIC; APJI; IAMAI & KANTAR; CIA WORLD FACTBOOK; COMPANY ADVERTISING RESOURCES AND EARNINGS REPORTS; OCDH; BETA RESEARCH CENTER; KEPIOS ANALYSIS. **ADVISORY:** SOCIAL MEDIA USERS MAY NOT REPRESENT UNIQUE INDIVIDUALS. **COMPARABILITY:** SIGNIFICANT REVISIONS TO SOURCE DATA, INCLUDING COMPREHENSIVE REVISIONS TO POPULATION DATA. FIGURES ARE NOT COMPARABLE WITH PREVIOUS REPORTS. ALL FIGURES USE THE LATEST AVAILABLE DATA, BUT SOME SOURCE DATA MAY NOT HAVE BEEN UPDATED IN THE PAST YEAR. SEE [NOTES ON DATA](#) FOR FULL DETAILS.

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DIGITAL GROWTH

CHANGE IN THE USE OF CONNECTED DEVICES AND SERVICES OVER TIME



YEAR-ON-YEAR CHANGE
+67 MILLION

YEAR-ON-YEAR CHANGE
+168 MILLION

YEAR-ON-YEAR CHANGE
+98 MILLION

YEAR-ON-YEAR CHANGE
+137 MILLION

SOURCES: UNITED NATIONS; GOVERNMENT BODIES; GSMA INTELLIGENCE; ITU; WORLD BANK; EUROSTAT; CNNIC; APJI; IAMAI & KANTAR; CIA WORLD FACTBOOK; COMPANY ADVERTISING RESOURCES AND EARNINGS REPORTS; OCDH; BETA RESEARCH CENTER; KEPIOS ANALYSIS. **ADVISORY:** SOCIAL MEDIA USERS MAY NOT REPRESENT UNIQUE INDIVIDUALS. **COMPARABILITY:** SIGNIFICANT REVISIONS TO SOURCE DATA, INCLUDING COMPREHENSIVE REVISIONS TO POPULATION DATA. FIGURES ARE NOT COMPARABLE WITH PREVIOUS REPORTS. ALL FIGURES USE THE LATEST AVAILABLE DATA, BUT SOME SOURCE DATA MAY NOT HAVE BEEN UPDATED IN THE PAST YEAR. SEE [NOTES ON DATA](#) FOR FULL DETAILS.

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OVERVIEW OF INTERNET USE

ESSENTIAL INDICATORS OF INTERNET ADOPTION AND USE



TOTAL
INTERNET
USERS



5.16
BILLION

AVERAGE DAILY TIME
SPENT USING THE INTERNET
BY EACH INTERNET USER



6H 37M
YOY: -4.8% (-20M)

INTERNET USERS AS
A PERCENTAGE OF
TOTAL POPULATION



64.4%
YOY: +1.1% (+70 BPS)

PERCENTAGE OF USERS
ACCESSING THE INTERNET
VIA MOBILE DEVICES



92.3%
YOY: +0.2% (+20 BPS)

YEAR-ON-YEAR CHANGE
IN THE TOTAL NUMBER
OF INTERNET USERS



+1.9%
+98 MILLION

PERCENTAGE OF USERS
ACCESSING THE INTERNET
VIA COMPUTERS AND TABLETS



65.6%
YOY: -7.9% (-560 BPS)

PERCENTAGE OF THE
TOTAL FEMALE POPULATION
THAT USES THE INTERNET



61.6%
YOY: +1.4% (+87 BPS)

we
are.
social

PERCENTAGE OF THE
TOTAL MALE POPULATION
THAT USES THE INTERNET



67.2%
YOY: +0.8% (+53 BPS)

PERCENTAGE OF THE
TOTAL RURAL POPULATION
THAT USES THE INTERNET



45.8%



Meltwater

SOURCES: KEPIOS ANALYSIS; ITU; GSMA INTELLIGENCE; EUROSTAT; WORLD BANK; GOOGLE'S ADVERTISING RESOURCES; CIA WORLD FACTBOOK; CNNIC; APJI; KANTAR & IAMAI; LOCAL GOVERNMENT AUTHORITIES; UNITED NATIONS. TIME SPENT AND MOBILE SHARE DATA FROM GWI (Q3 2022). SEE [GWI.COM](#) FOR MORE DETAILS. **NOTES:** GENDER DATA ARE ONLY AVAILABLE FOR "FEMALE" AND "MALE". PERCENTAGE CHANGE FIGURES IN THE BOTTOM ROWS OF DATA SHOW RELATIVE YEAR-ON-YEAR CHANGE. "BPS" FIGURES REPRESENT BASIS POINTS, AND SHOW ABSOLUTE YEAR-ON-YEAR CHANGE.

COMPARABILITY: SOURCE AND BASE CHANGES. ALL FIGURES USE THE LATEST AVAILABLE DATA, BUT SOME SOURCE DATA MAY NOT HAVE BEEN UPDATED IN THE PAST YEAR. SEE [NOTES ON DATA](#) FOR DETAILS.

JAN
2023

OVERVIEW OF CONSUMER GOODS ECOMMERCE

HEADLINES FOR THE ADOPTION AND USE OF CONSUMER GOODS ECOMMERCE (B2C ONLY)



NUMBER OF PEOPLE PURCHASING CONSUMER GOODS VIA ONLINE CHANNELS IN 2022



4.11
BILLION

YEAR-ON-YEAR CHANGE

+8.3% (+315 MILLION)

ESTIMATED TOTAL ANNUAL SPEND ON ONLINE CONSUMER GOODS PURCHASES (USD, 2022)

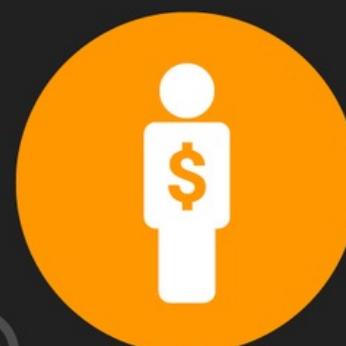


\$3.59
TRILLION

YEAR-ON-YEAR CHANGE

-6.5% (-\$250 BILLION)

AVERAGE ANNUAL REVENUE PER CONSUMER GOODS ECOMMERCE USER (USD, 2022)



\$873

YEAR-ON-YEAR CHANGE

-13.7% (-\$138)

SHARE OF 2022 CONSUMER GOODS ECOMMERCE SPEND ATTRIBUTABLE TO PURCHASES MADE VIA MOBILE PHONES



59.8%

YEAR-ON-YEAR CHANGE

+1.2% (+71 BPS)

2022 ONLINE PURCHASES vs. TOTAL CONSUMER GOODS PURCHASE VALUE ACROSS ALL RETAIL CHANNELS



17.1%

YEAR-ON-YEAR CHANGE

+4.4% (+72 BPS)

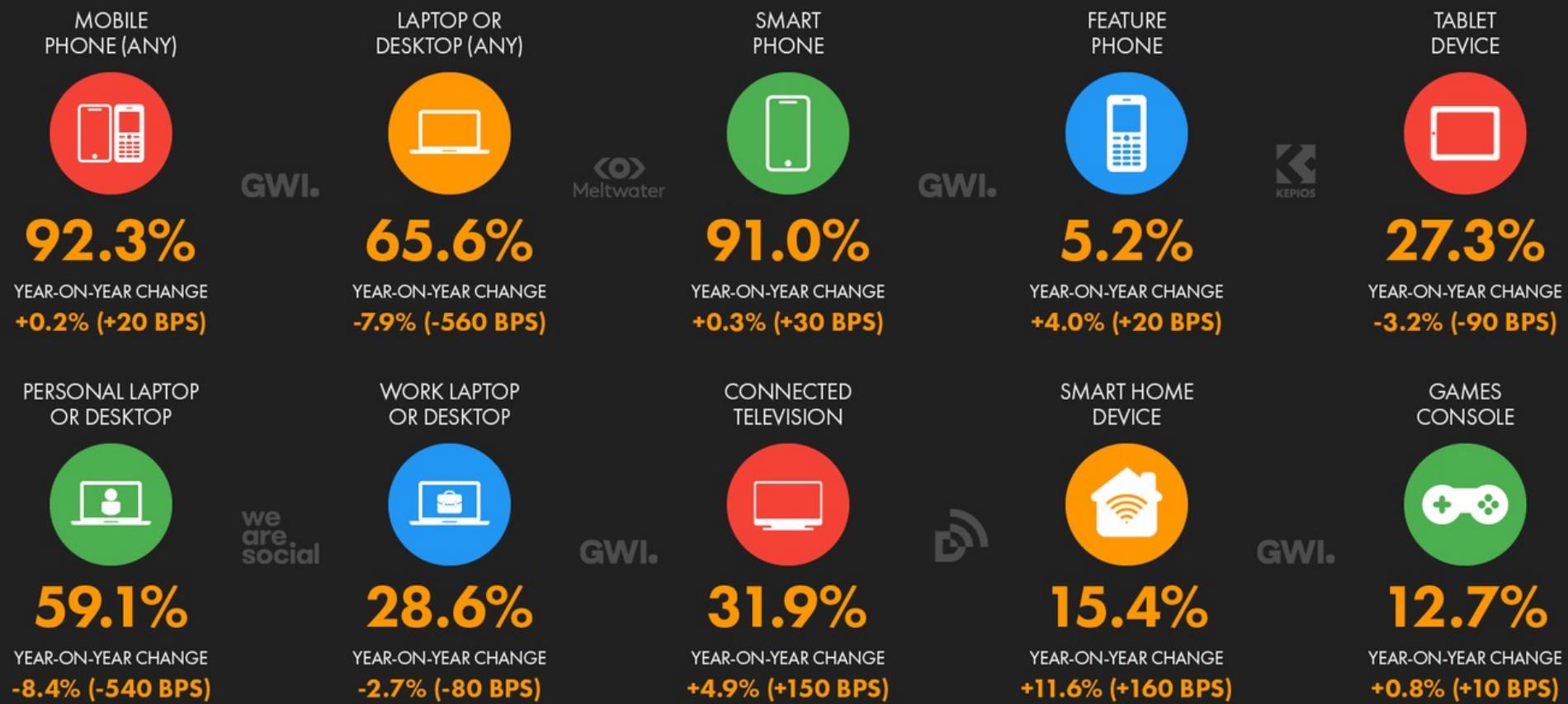
SOURCE: STATISTA DIGITAL MARKET OUTLOOK. SEE STATISTA.COM FOR MORE DETAILS. **NOTES:** "CONSUMER GOODS" INCLUDE: ELECTRONICS, FASHION, FURNITURE, TOYS, HOBBY, DIY, BEAUTY, CONSUMER HEALTHCARE, PERSONAL CARE, HOUSEHOLD CARE, FOOD, BEVERAGES, AND PHYSICAL MEDIA. FIGURES REPRESENT ESTIMATES FOR FULL-YEAR 2022, AND COMPARISONS WITH EQUIVALENT VALUES FOR THE PREVIOUS CALENDAR YEAR. FINANCIAL VALUES ARE IN U.S. DOLLARS. PERCENTAGE CHANGE VALUES ARE RELATIVE (I.E. AN INCREASE OF 20% FROM A STARTING VALUE OF 50% WOULD EQUAL 60%, NOT 70%). "BPS" VALUES REPRESENT BASIS POINTS, AND INDICATE ABSOLUTE CHANGE. **COMPARABILITY:** BASE AND CATEGORY DEFINITION CHANGES. FIGURES ARE NOT COMPARABLE WITH PREVIOUS REPORTS.

362

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DEVICES USED TO ACCESS THE INTERNET

PERCENTAGE OF INTERNET USERS AGED 16 TO 64 WHO USE EACH KIND OF DEVICE TO ACCESS THE INTERNET



SOURCE: GWI (Q3 2022). FIGURES REPRESENT THE FINDINGS OF A BROAD GLOBAL SURVEY OF INTERNET USERS AGED 16 TO 64. SEE GWI.COM FOR FULL DETAILS. NOTES: "MOBILE PHONE (ANY)" INCLUDES USERS WHO ACCESS VIA A SMARTPHONE OR A FEATURE PHONE. "LAPTOP OR DESKTOP (ANY)" INCLUDES USERS WHO ACCESS VIA THEIR OWN COMPUTER OR A COMPUTER PROVIDED BY THEIR EMPLOYER. PERCENTAGE CHANGE VALUES REFLECT RELATIVE CHANGE. "BPS" VALUES SHOW THE CHANGE IN BASIS POINTS, AND REFLECT ABSOLUTE CHANGE.

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UNCONNECTED POPULATIONS

COUNTRIES AND TERRITORIES WITH THE LARGEST UNCONNECTED POPULATIONS AND THE LOWEST LEVELS OF INTERNET ADOPTION



ABSOLUTE: LARGEST UNCONNECTED POPULATIONS

#	LOCATION	UNCONNECTED POPULATION	% OF POP. OFFLINE
01	INDIA	730,027,000	51.3%
02	CHINA	374,709,000	26.3%
03	PAKISTAN	150,779,000	63.3%
04	BANGLADESH	105,138,000	61.1%
05	ETHIOPIA	104,073,000	83.3%
06	NIGERIA	98,635,000	44.6%
07	DEM. REP. OF THE CONGO	77,568,000	77.1%
08	INDONESIA	63,514,000	23.0%
09	TANZANIA	45,456,000	68.4%
10	KENYA	36,699,000	67.3%

RELATIVE: LOWEST LEVELS OF INTERNET ADOPTION

#	LOCATION	% OF POP. OFFLINE	UNCONNECTED POPULATION
01	NORTH KOREA ¹	>99.9%	[BLOCKED]
02	SOUTH SUDAN	93.0%	10,223,000
03	SOMALIA	90.2%	16,108,000
04	BURUNDI	89.8%	11,734,000
05	CENTRAL AFRICAN REPUBLIC	89.4%	5,058,000
06	ETHIOPIA	83.3%	104,073,000
07	CHAD	82.1%	14,776,000
08	AFGHANISTAN	81.6%	34,008,000
09	MADAGASCAR	80.3%	24,061,000
10	MOZAMBIQUE	79.3%	26,504,000

SOURCES: KEPiOS ANALYSIS; ITU; GSMA INTELLIGENCE; EUROSTAT; WORLD BANK; GOOGLE'S ADVERTISING RESOURCES; CIA WORLD FACTBOOK; CNNIC; APJI; KANTAR & IAMAI; LOCAL GOVERNMENT AUTHORITIES; UNITED NATIONS. **NOTES:** FIGURES IN THE "% OF POP. OFFLINE" COLUMN REPRESENT THE PERCENTAGE OF THE POPULATION THAT DOES NOT YET USE THE INTERNET. ABSOLUTE VALUES HAVE BEEN ROUNDED TO THE NEAREST THOUSAND. ⁽¹⁾ THE INTERNET (AT LEAST AS THE REST OF THE WORLD KNOWS IT) REMAINS BLOCKED FOR EVERYDAY CITIZENS IN NORTH KOREA. **COMPARABILITY:** SOURCE AND BASE CHANGES. ALL FIGURES USE THE LATEST AVAILABLE DATA, BUT SOME SOURCE DATA MAY NOT HAVE BEEN UPDATED IN THE PAST YEAR. SEE [NOTES ON DATA](#) FOR DETAILS.

What is the impact?

- A global divide is evident between industrialized and developing societies.
- A social divide is apparent between rich and poor within each nation.
- Norris, P. 2001. Digital Divide: Civic Engagement, Information Poverty, and the Internet Worldwide.



Cause and Effect

- Clearly, poor communities have lower access to computers and technology (and hence, information).
- But does lower access to ICT (information and communications technology) contribute to them being poor?



The critics' argument

- ICTs are a waste of money
 - Funding should be directed to more important areas of impact and real need (such as food and medicines)
- There is the risk of disillusionment
 - ICTs will not necessarily provide benefits and may in fact open people up to new forms of harm



The supporters' rebuttal

- The digital divide will become perilously wider if ICTs are not promoted
- ICTs can support other social and economic goals to improve peoples lives
- Access to ICTs and participation in the Information Society will have far reaching benefits



Different forms (or stages) of the digital divide

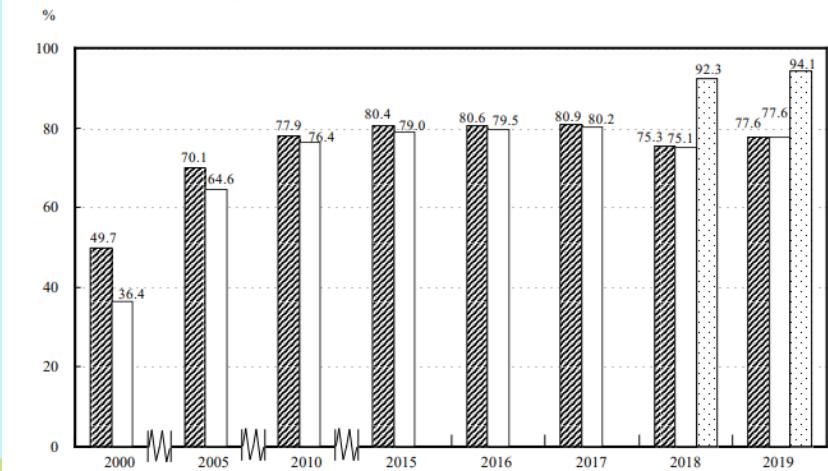
- Economic divide: Those who have computers and Internet access vs those who do not.

表 2 按年齡／性別劃分的擁有智能手機⁽¹⁾的 10 歲及以上人士數目
Table 2 Persons aged 10 and over who had smartphone⁽¹⁾ by age / sex

年齡組別／性別 Age group / Sex	統計期間 ⁽²⁾ Survey period ⁽²⁾					人數 No. of persons ('000)
	2012 年 6月至8月 Jun - Aug 2012	2015 年 5月至8月 May - Aug 2015	2017 年 6月至9月 Jun - Sep 2017	2018 年 6月至9月 Jun - Sep 2018	2019 年 4月至7月 Apr - Jul 2019	
年齡組別 Age group						
10 - 14	140.3 (46.1%)	201.1 (76.9%)	214.5 (81.3%)	220.3 (81.1%)	237.4 (81.3%)	
15 - 24	678.6 (80.3%)	760.5 (97.9%)	723.1 (99.5%)	698.2 (99.4%)	673.1 (99.6%)	
25 - 34	830.9 (87.0%)	951.4 (98.8%)	954.7 (99.8%)	935.5 (99.8%)	940.0 (99.9%)	
35 - 44	782.2 (74.5%)	1 002.4 (97.5%)	1 018.1 (99.4%)	1 031.1 (99.6%)	1 029.9 (99.7%)	
45 - 54	637.6 (51.1%)	1 110.3 (93.4%)	1 119.6 (97.8%)	1 108.2 (98.7%)	1 103.3 (99.3%)	
55 - 64	262.9 (27.4%)	871.1 (81.0%)	1 053.4 (92.5%)	1 122.0 (94.7%)	1 165.8 (96.5%)	
≥ 65	63.3 (6.9%)	373.9 (35.4%)	604.8 (52.1%)	696.2 (57.2%)	824.0 (65.1%)	
性別 Sex						
男性 Male	1 705.4 (56.4%)	2 560.6 (84.4%)	2 748.3 (90.1%)	2 794.1 (91.0%)	2 866.7 (92.7%)	
女性 Female	1 690.5 (51.8%)	2 710.2 (81.7%)	2 940.0 (87.3%)	3 017.5 (88.8%)	3 106.9 (90.5%)	
合計 Overall	3 395.9 (54.0%)	5 270.8 (83.0%)	5 688.3 (88.6%)	5 811.6 (89.8%)	5 973.6 (91.5%)	



圖 1 家中有個人電腦⁽¹⁾的住戶、家中有個人電腦⁽¹⁾接駁互聯網的住戶及家中有接駁互聯網的住戶佔所有住戶的百分比
Chart 1 Percentage of households with personal computer (PC)⁽¹⁾ at home, households with PC⁽¹⁾ at home connected to the Internet and households with access to the Internet at home among all households

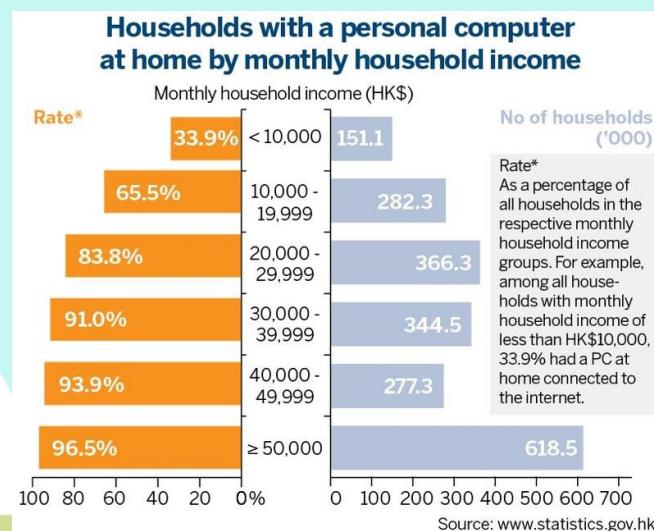


Source Hong Kong Census, Usage of Information Technology and the Internet by Hong Kong Residents, 2000 to 2016



But even in Hong Kong

- In Hong Kong:
- *94% of households had access to the Internet in 2019, but the rate of Internet access for families with monthly household income below HK\$10,000 was much lower at 71%*



- Legislative Council Essentials (ISE01/20-21)

<https://www.chinadailyhk.com/article/129874#Deprived-HK-kids-at-losing-end-as-virus-widens-digital-divide>



Photo source: South China Morning Post, 4 Sept, 2020

Different forms (or stages) of the digital divide

- Usability divide: Those who are able to use digital contents vs those who don't.
- Lots of reasons: disability, literacy, familiarity...



8% males and 1% females color blind!
 Have you ever experienced a color-blind world?
 Try it!
<http://colorfilter.wickline.org/>

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The Broad Discipline of Computing offers three application-oriented programmes specializing in different facets of professional Information Technology (IT) education.

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Bsc (Hons) in Computing
BSc (Hons) in Enterprise Information Systems
BSc (Hons) in Information Technology

<https://www.toptal.com/designers/colorfilter>

WHAT'S NEW

FinTech Seminar
14 Sep 2017
FREE to join!

30 Sep 2017
 Come to visit us at PolyU Education Info Day 2017

11 Jul 2017
 COMP alumnus Mr Horace Chow was appointed Chief Operating Officer of Microsoft China

AWARDS & ACHIEVEMENTS

COMP AWARDS

25 Jul 2017
 COMP student won the Bronze Award in China Pan-Pearl River Delta Region University IT Project Competition 2017

17 Jul 2017
 COMP student won the Silver Award in the 31st World Genius Convention

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Old COMP homepage, as it appears to normal people, and people with red green color-blindness

Web Accessibility Recognition Scheme by OGCIO

- Best Practices for Accessible Content
- Do not rely on color as a navigational tool or as the sole way to differentiate items
- Images should include Alt text in the markup/code.
- Images with text on them may NOT be used as sole content. Complex images of this type should have descriptions near the image (perhaps as a caption or descriptive summaries built right into a neighboring paragraph)
- Tables need a summary description. Tell visitors the number of columns and rows, giving a brief description of layout.
- Provide transcripts for podcasts
- If you have a video on your site, you must provide visual access to the audio information through in-sync captioning
- Consider 508 testing to assure your site is in compliance

<https://www.lamar.edu/web-communication/cms/web-accessibility.html>





Do we need new Accessibility Recognition Scheme in Metaverse or XR?

Computer (or digital) literacy plays a very big role...



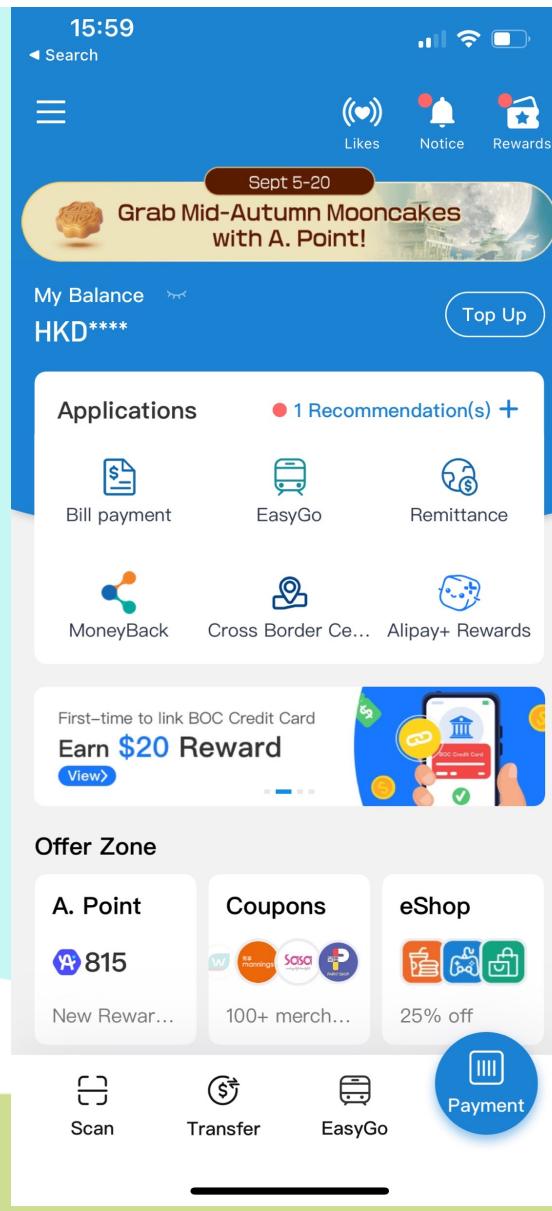
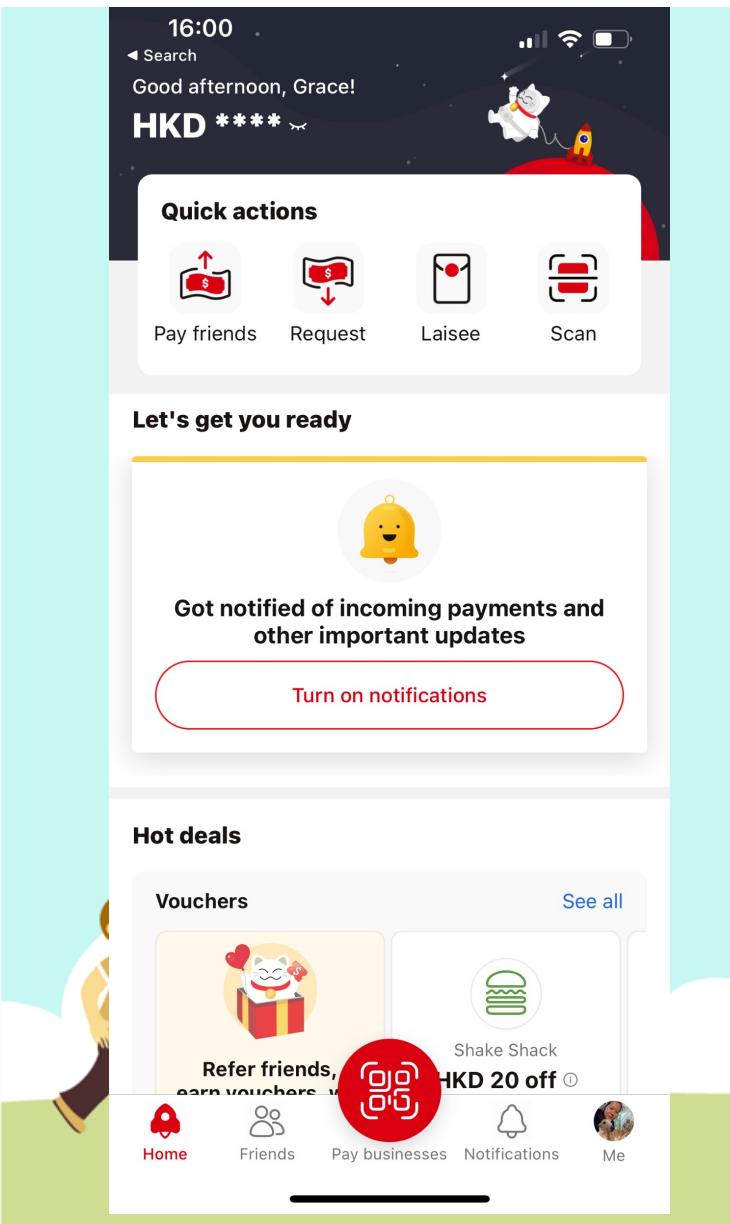
https://corporate.hkjc.com/corporate/corporate_news/english/2021-12/news_2021122101007.aspx



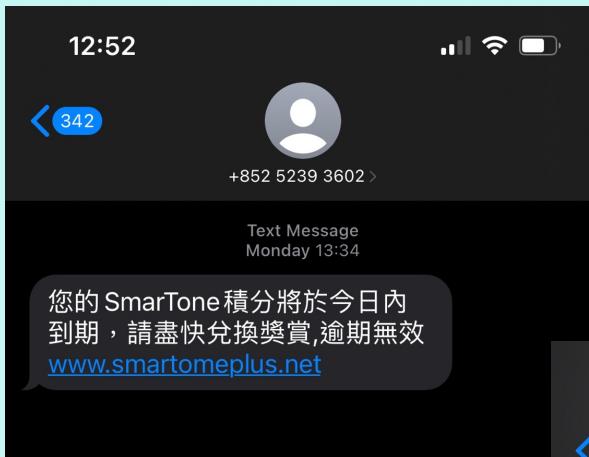
As does Interface Design...

*I paid you...
No you didn't...
I can show you...*

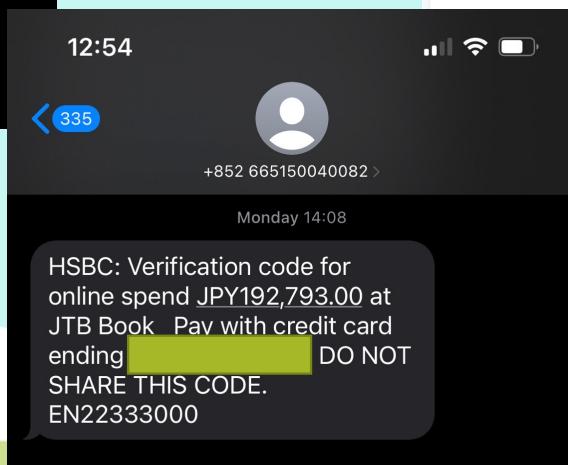
Where is my list of transactions?



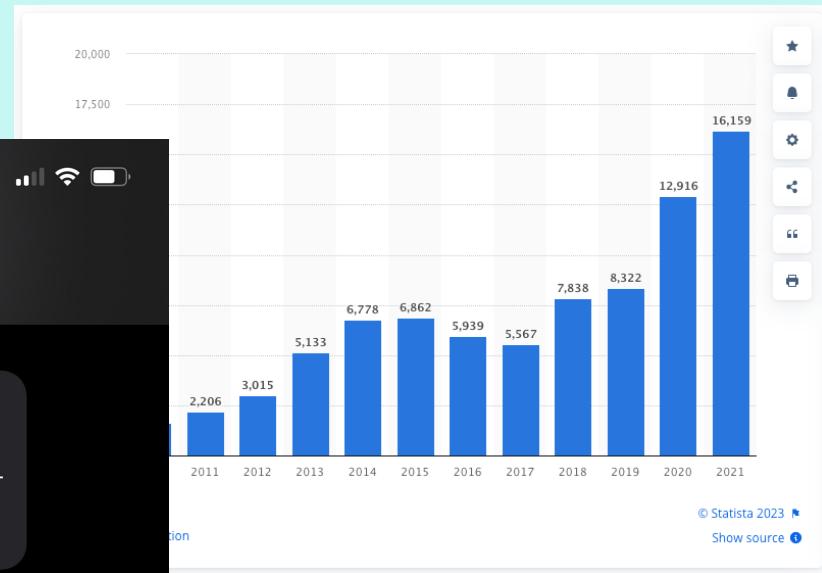
Safe use is also a concern!



See anything wrong?

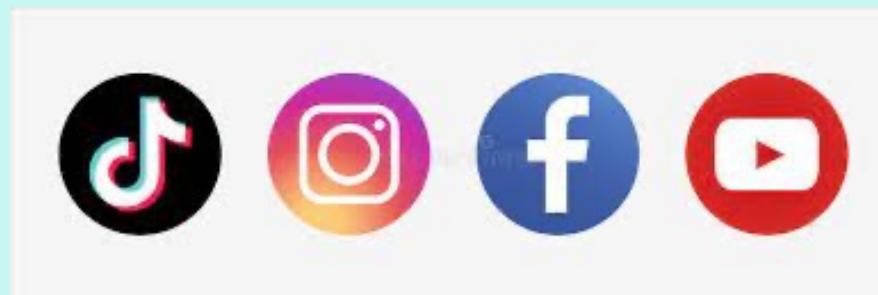


Total number of computer crime cases in Hong Kong, 2010-2021
Source: Statista.com



Different forms (or stages) of the digital divide

- Empowerment divide: Those who are able to produce digital contents vs those who don't

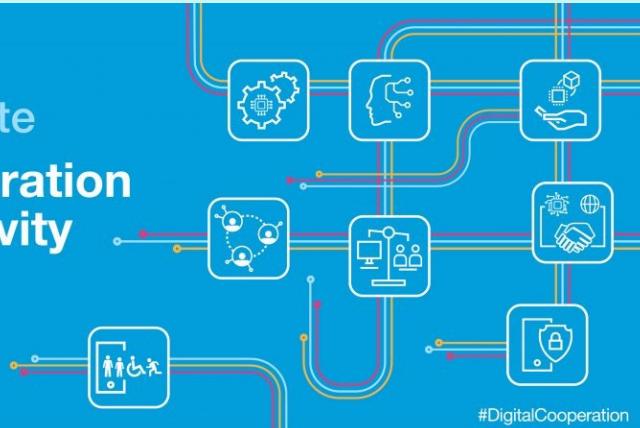


High-level thematic debate

Digital cooperation and connectivity

27 April 2021

United Nations, New York



United Nations
Office of the Secretary-General's
Envoy on Technology



UN
environment
programme



#DigitalCooperation and Connectivity



DIGITAL INCLUSION

The digital world must be inclusive to everyone, everywhere.



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DIGITAL HUMAN RIGHTS

The inequalities experienced offline are often repeated online.



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#DigitalCooperation and Connectivity



DIGITAL TECH IS A GAME-CHANGER

Digital technologies can bring humanity closer together, provide education and job opportunities, and grant access to essential public services.



United Nations
Office of the Secretary-General's
Envoy on Technology



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Opportunity and Social Mobility

- “Movement of individuals or groups in social position over time.”
 - Tied to equality of opportunity
- Enabled by capital -- economic, cultural, human, social, physical, symbolic
- What does the digital divide have to do with social mobility?



Digital Literacy

- Definition from Wikipedia:
 - an individual's ability to **find, evaluate, and communicate information** by utilizing technical or digital media platforms
 - combination of both **technical and cognitive** abilities in using information and communication technologies to create, evaluate, and share information
- Promotes social mobility by providing individuals with the skills and knowledge needed for today's economy



13:00 Search ChatGPT 30

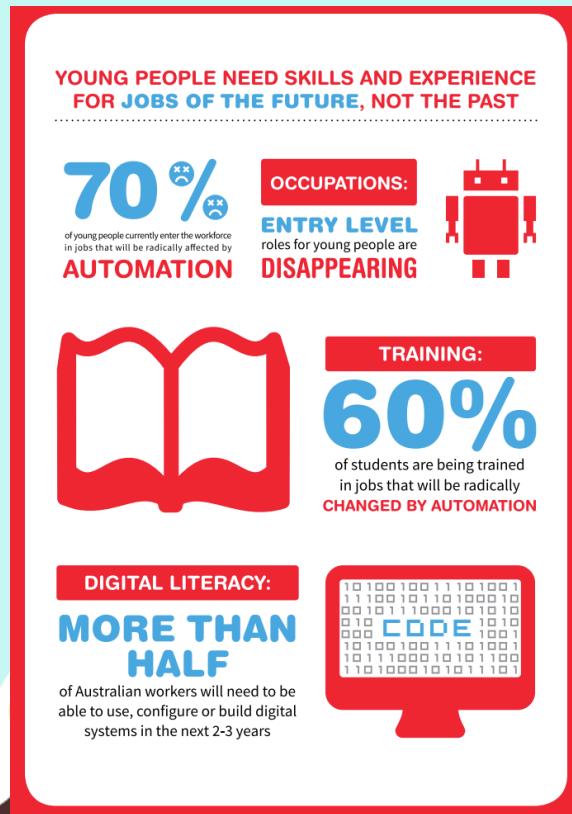
What is digital literacy?

Digital literacy is the ability to effectively use and navigate digital technologies, including computers, smartphones, and the internet. It includes skills such as searching for information online, evaluating the credibility of sources, communicating through digital platforms, creating and sharing content, and protecting one's privacy and security online. Digital literacy is essential in today's increasingly digital world, as it enables individuals to access and participate in a wide range of social, educational, and economic opportunities. It is also important for critical thinking, problem-solving, and lifelong learning.

Like Dislike Share

A cartoon illustration of a small orange dog with a black collar, running on a green grassy hill. The dog is facing towards the right. The background features white clouds against a light blue sky.

Digital Literacy and Social Mobility



Foundation for Young Australian Report, The New Work Order, 2015

Different skill levels required across the labor market and “citizenry in general”

- *Make or Break: the UK's Digital Future*

‘Digital muggle’: 2.2 million people (7% of the workforce); “... no digital skills required—digital technology may as well be magic”.

‘Digital citizen’: 10.8 million people (37% of the workforce); “... the ability to use digital technology purposefully and confidently to communicate, find information and purchase goods/services”.

‘Digital worker’: 13.6 million people (46% of the workforce); “... at the higher end, the ability to evaluate, configure and use complex digital systems. Elementary programming skills such as scripting are often required for these tasks”.

‘Digital maker’: 2.9 million people (10% of the workforce); “... skills sufficient to build digital technology (typically software development)”.¹⁹⁰

The Digital Literacy (DL) divide

- Even in Hong Kong, there is a “gigantic” digital literacy divide among students
 - P5 students from the best performing primary school have better DL than the overall performance of F5 students
 - F5 students’ digital literacy in the worst performing secondary school was worse than the overall performance of P5 students
- Family socioeconomic status (SES) plays a part – but not once students progress beyond primary school
 - But schools with higher mean SES have students with higher digital literacy
 - And within these schools, even students with lower family SES have similar digital literacy compared with their higher family SES counterparts

So clearly one takeaway is : digital literacy is tied to socioeconomic status (directly or indirectly)

Source: HKU Press, https://hku.hk/press/news_detail_24442.htm

Interestingly...

- The HKU study found that the “total effect of time spent on digital devices” on mental health to be not statistically significant
- But the level of digital literacy had a statistically significant correlator with mental health
- “Digital literacy is a protective factor that suppresses the potential negative impact associated with time spent on using digital devices on mental health.”



Digital Literacy, STEM education and Income

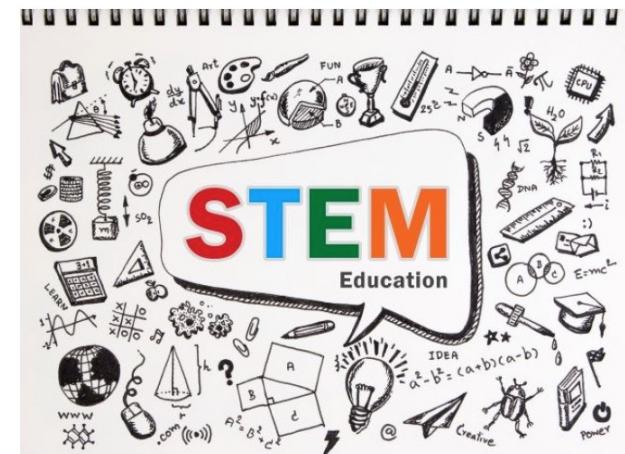
Students from low-income families have less access to STEM learning, new study finds

YP / Discover / News / Hong Kong

Students from low-income Families have less access to Stem courses

A local study found that students from low-income families have fewer opportunities to study Stem subjects

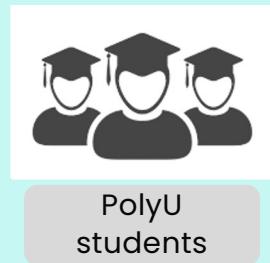
by Nicola Chan | Published: 10:37am, 4 Sep, 2018 ▾



Published August 18, 2021
By: USBE Online



Service Project – Help to bridge the digital literacy divide through STEM education



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communities

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