

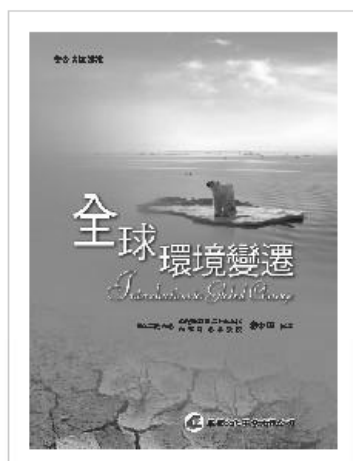
全球變遷導論

柳中明

全變通識-1 (liucm)

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全球環境變遷



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商品語言 / 中文/繁體

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| 週次 | 單元主題 |
|-----|----------------------|
| 第1週 | 變遷的源頭 (9/16) |
| 第2週 | 古氣候與文明變遷 (9/23) |
| 第3週 | 地貌變遷 (9/30) |
| 第4週 | 水、空氣變遷 (10/7) |
| 第5週 | 過去百年氣候變遷 (10/14) |
| 第6週 | 未來百年氣候變遷 (10/21) |
| 第7週 | 變遷衝擊(一)冰貌、海岸 (10/28) |
| 第8週 | 變遷衝擊(二)生態、疾病 (11/4) |

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| | |
|------|---------------------------|
| 第9週 | 變遷衝擊(三)水、森林、糧食 (11/11) |
| 第10週 | 變遷衝擊(四)基礎建設、社會、經濟 (11/18) |
| 第11週 | 變遷因應(一)國際公約(11/25) |
| 第12週 | 變遷因應(二)新能源 (12/2) |
| 第13週 | 氣候談判 (12/9) |
| 第14週 | 變遷因應(三)碳市場與低碳經濟 (12/16) |
| 第15週 | 永續發展 (12/23) |
| 第16週 | 變遷中的人文創意 (12/30) |
| 第17週 | 分組報告 (100/1/6) |

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<評量方式及評分標準>

1. 每週500字內之小報告，針對當週二個討論課題，表達讀書心得。(20%)
(手寫或打字不拘，下課後就不能補交。)
2. 平時討論 (40%) (討論時五~六人一組)
3. 最後一週分組報告(40%)(每組五~六人，題目自選，時間15分鐘)

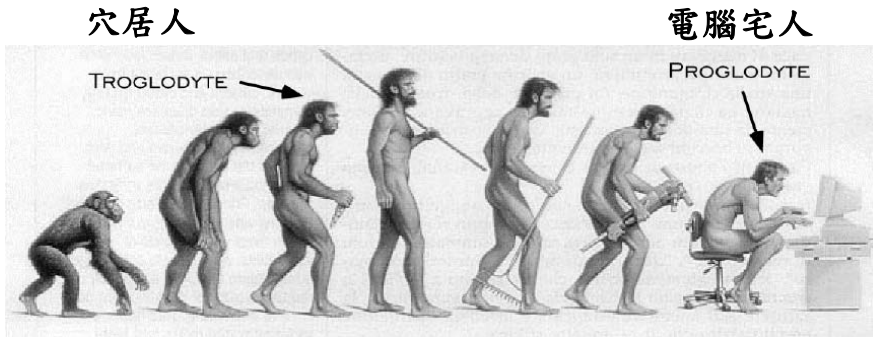
變遷的源頭

柳中明

1. 人口數量的變遷
2. 人口結構的變遷
3. 人口素質的變遷

討論題綱：

- a. 老化是否伴隨競爭力衰退？
- b. 你會參加「饑餓三十」活動嗎？



量

質

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Human Population
6,728,482,670

一秒鐘
 約有三
 人出生

2009/2/9

Un/Freeze

February 9, 2009 22:42:32

Do this time

<http://opr.princeton.edu/popclock>

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September 1, 2010

The World Population Clock

2010/9/2

People

Administration
Faculty
Staff
Students
Inhs

by Germán and Nicolás Rodríguez

If you have a java-enabled browser you will see our World Population Clock dynamically updated at every tick of the clock.

Research

Projects
Seminars
Working Papers
Publications
Dissertations



一秒鐘
約有三
人出生

Training

Prospective
Students
Programs
Courses
Course Schedule

This clock is synchronized with the World Population Clock at the [U.S. Census Bureau](#), and provides essentially the same estimate of the population of the world for any time between July 1, 2010 and June 30, 2011. (Last updated July 14, 2010.)

To launch the Population Clock on a small popup window [click here](#).

Resources

Data Archive
Library
Pop Index
NIH Public
Access Policy

For more information on world population data and population clocks, visit the [U.S. Census Bureau](#) website.

Comments or questions: grodrri@opr.princeton.edu

明年可能
全球達70
億!!

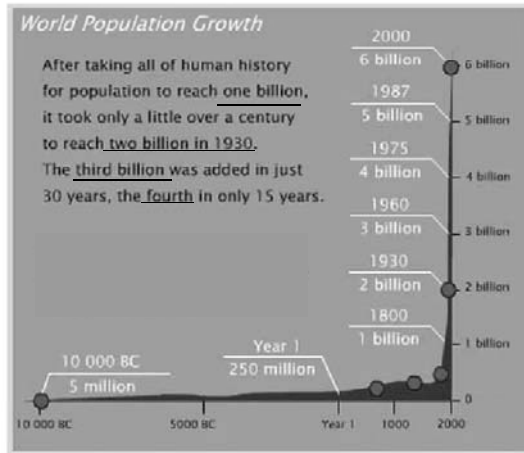
<http://opr.princeton.edu/popclock>

liucm

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I. 人口數量的變遷

Human Population Growth



| 十億 | Billions | Time (Years) |
|--------|----------|--------------|
| 1 | 1 | >60,000 |
| 2 | 2 | 123 |
| 3 | 3 | 33 |
| 4 | 4 | 14 |
| 5 十億 | 5 | 13 |
| (1800) | 6 | 11 |

每十億人口出現的時間
愈來愈短！

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距今五千年前(約120百萬)
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http://en.wikipedia.org/wiki/Image:Population_curve.svg

為何 人口增加速率 如此之快！

- **What factors determine world population change?**
- **Birth rate.** 出生率
- **Death rate.** 死亡率
- **Population will increase if birth rate is greater than death rate.**

當出生率大於死亡率，則人口會增加。

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以過去數據進行線性外延推測，為何不正確？

- Was the model incorrect?
- No - birth rate and death rate were the only relevant variables.
- Were **previous trends** a bad indicator of the future?
- Yes - **death rate dropped** very rapidly over the last 150 years due to better healthcare, nutrition and living conditions.

因為更好的健康照顧、營養與生活狀況，死亡率顯著下降，才使得全球人口迅速上升！

預測未來

| | | |
|-------------|------|-----------------|
| 1 Billion | 1804 | |
| 2 Billion | 1927 | 123 years later |
| 3 billion | 1960 | 33 years later |
| 4 Billion | 1974 | 14 years later |
| 5 Billion | 1987 | 13 years later |
| 6 Billion | 1999 | 12 years later |
| 6.7 Billion | 2008 | |
| 6.9 Billion | 2010 | |
| 7 Billion | ? | |

Factors affecting Growth Rate

Growth rate(成長率) = Birth Rate - Death Rate

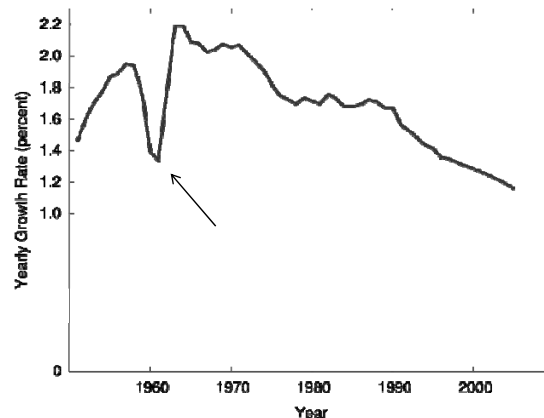
Of these the Birth Rate is the **most important** contributor, specifically the Fertility Rate (#children/woman)(每位婦女的生育率)

Why? Because death rates have stabilized...

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全球人口成長率(%/年)



http://en.wikipedia.org/wiki/Image:World_population_increase_history.svg

全變通識-1 (liucm)

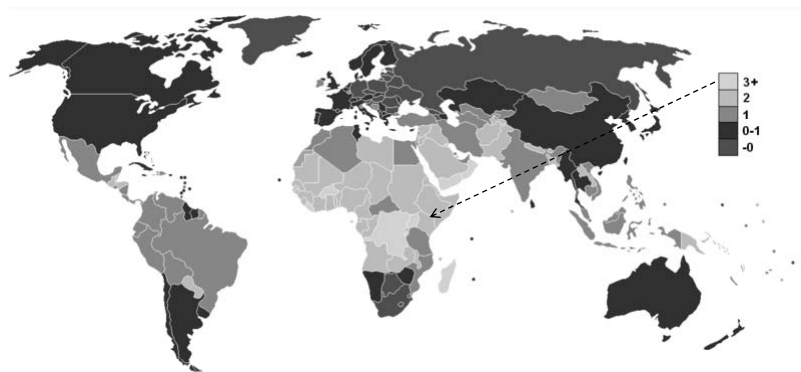
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全球人口成長率在二次大戰時，出現顯著減少，爾後迅速回復。

1960年代中期後，則出現成長率長期減少趨勢，為何如此？(想想看，為何台灣的人口成長率持續下滑?)

為何全球人口仍持續增加？(因為成長率是正值)

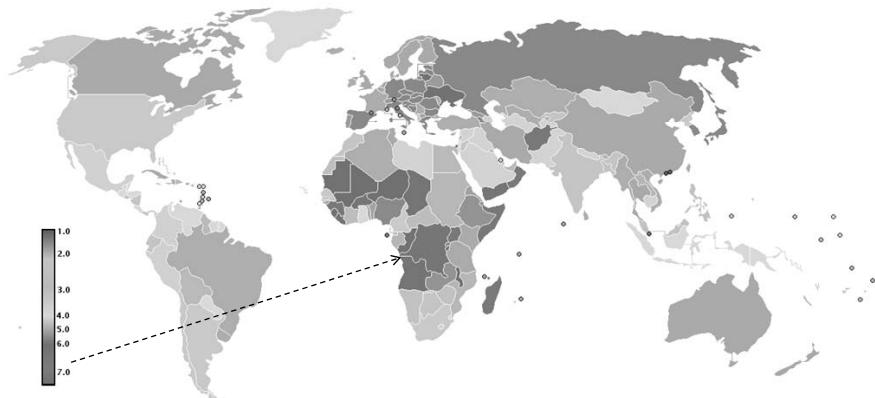
各國人口成長率(%/年)



注意：高的成長率出現在非洲等第三世界國家？

http://en.wikipedia.org/wiki/Image:World_population.svg

各國婦女的生育率



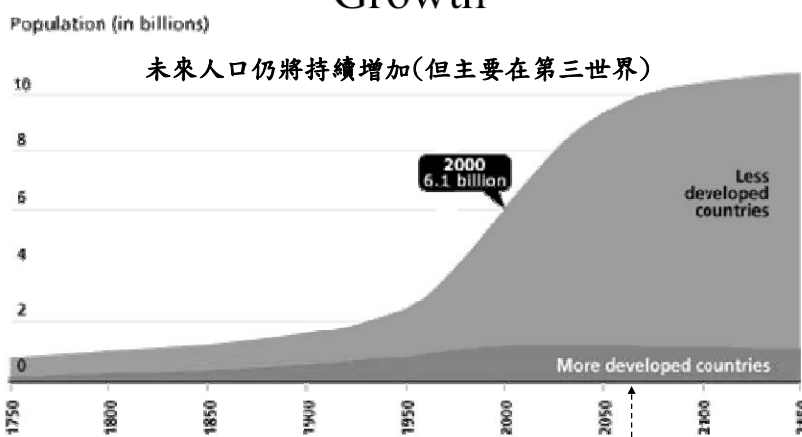
注意：高的生育率出現在非洲等第三世界國家？

http://en.wikipedia.org/wiki/Image:Fertility_rate_world_map_2.png

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Distribution of Population Growth projected by UN



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World Population Growth: Past, Present, and Future

| Pop. Size... | Reached in... | Interval between next 1 Billion people... |
|--------------|---------------|---|
| 1 Billion | 1804 | |
| 2 Billion | 1927 | 123 years later |
| 3 billion | 1960 | 33 years later |
| 4 Billion | 1974 | 14 years later |
| 5 Billion | 1987 | 13 years later |
| 6 Billion | 1999 | 12 years later |
| 7 Billion | 2011 | 12 years later |
| 8 Billion | 2025 | 14 years later |
| 9 billion | 2050 | 25 years later |

全球人口成長率持續在減少，所以未來每增加十億的人口所需要的時間，正“緩緩”增長。

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如何能讓全球人口增加的更慢？(除了增加死亡率外)

Lessons on population control from Thailand, South Korea, Japan, India, and China:

Invest in Family Planning 家庭計畫
Reduce poverty 降低貧窮戶
Elevate the status of women 提高女性地位

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為何要控制全球人口？

為何不能訂定國際公約來強制約束？

人口下降後，人口結構會如何調整？

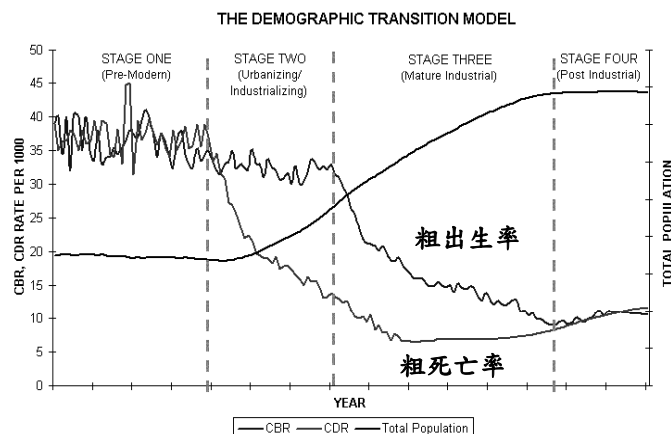
II. 人口結構的變遷

人口結構的四個階段

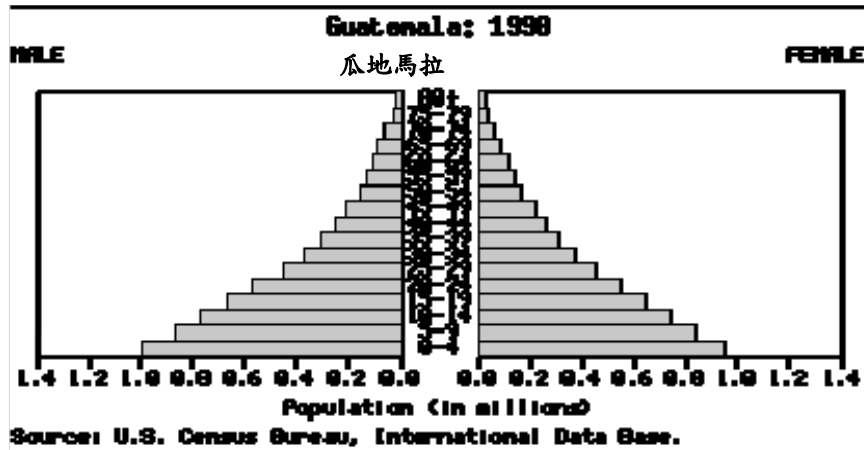
1. The **Preindustrial Stage** when there is little population growth because harsh social conditions lead to both high death and high birth rates. 工業發展前
2. The **Transitional Stage**, when industrialization begins and health care improves, resulting in lowered death rates, but birth rates remain high. Most of the developing world here. 過度期
3. The **Industrial Stage**, when the birth rate drops due to modernization (and its accompanying social changes). Many developed countries and a few developing countries here. 工業化時期
4. Finally, the **Postindustrial Stage** is recognized by further reductions in birth rates, approaching or even below zero population growth. Approximately 13% of the world population (mostly European countries) is in this stage. 後工業化時期

A complete DT exhibits both declining birth and death rates

Demographic Transition



Transitional Stage (I)



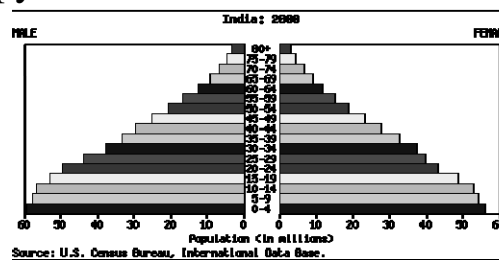
2.9% growth rate; 4.8 births/woman; 43% population under 15 yrs

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Why is this group so important?

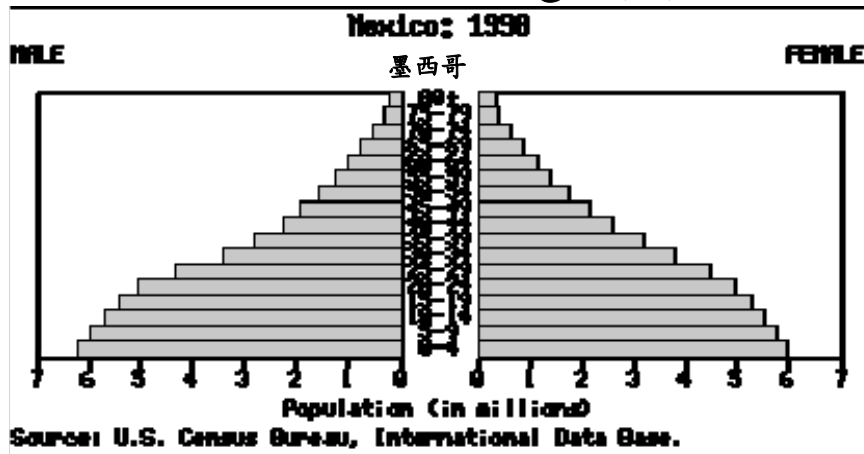
- Largest segment of population today..
- Will be even larger in the future because **most of population is under childbearing age (<15 yrs)**. (多數人口在15歲以下)
- population pyramid of India 印度



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Industrial Stage (II)

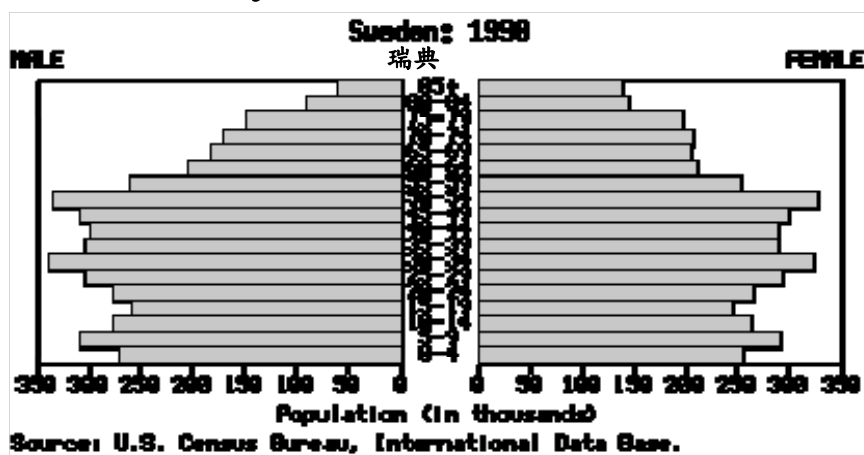


1.9% growth rate

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Early Postindustrial (III)

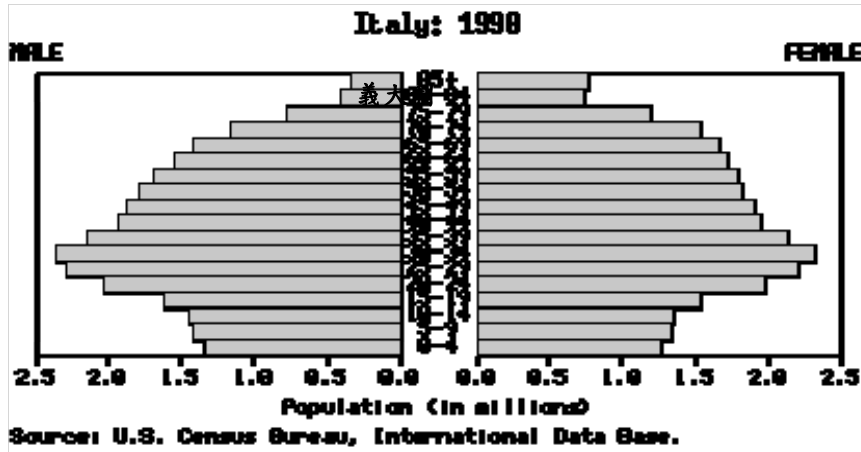


0.1% growth rate; 1.8 births/woman; 18% of population under 15 yrs

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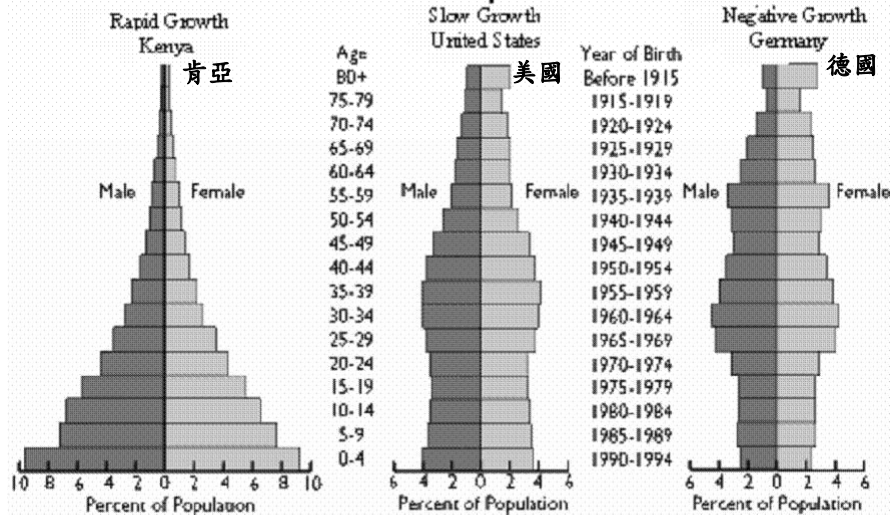
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Late Postindustrial (VI)



-0.1% growth rate; 1.2 births/woman; 14% population under 15 yrs

Three Patterns of Population Change

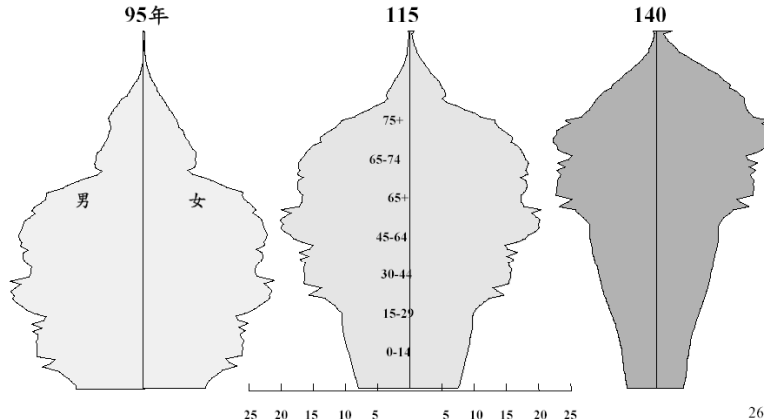


source: United Nations, The Sex and Age Distribution of the World Population, The 1994 Revision, New York, 1994



臺灣未來人口金字塔

- 依中推計，15-64歲工作年齡人口比例，未來15年間尚維持70%左右，之後開始下降至140年降為55%。其對65歲以上高齡人口的扶養比，將自95年之7.2：1降為115年之3.3：1，140年更降為1.5：1。

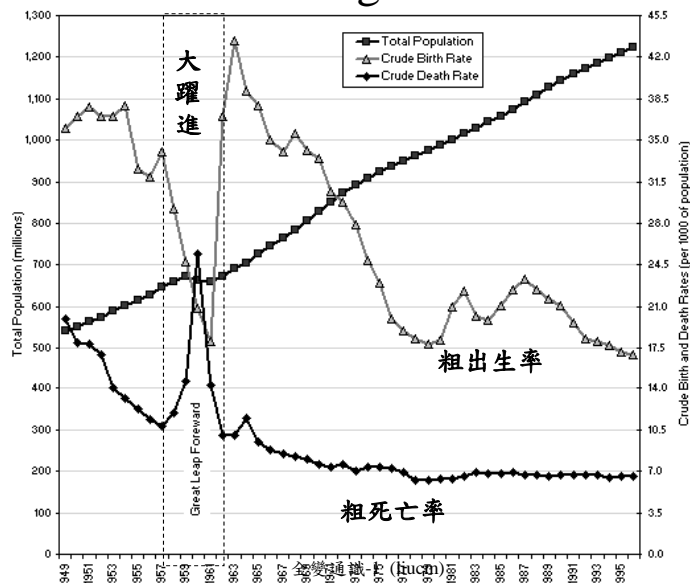


[http://www.cepd.gov.tw/ml.aspx?sNo=0000455&key=&ex=%20&ic=全變通識-1 \(liucm\)](http://www.cepd.gov.tw/ml.aspx?sNo=0000455&key=&ex=%20&ic=全變通識-1 (liucm))

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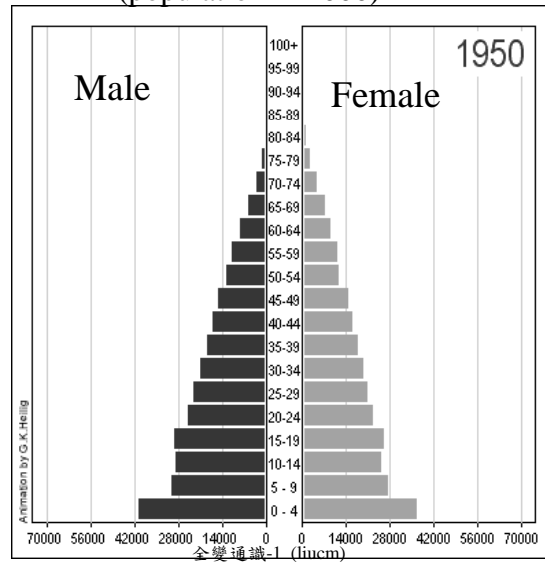
In what stage is China? 中國



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China's Population by Age & Sex, 1950 - 2050
(population in 1000)

中國



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當人口結構因為出生率與死亡率都顯著下降時，人口總量也會被控制下來。

而人口結構的調整有與國家經社狀態有關，所以推動經濟發展，會是控制人口的最有效策略。

但是，經濟發展不是說動就動，牽涉到太多因素，其中包括「人的素質」。

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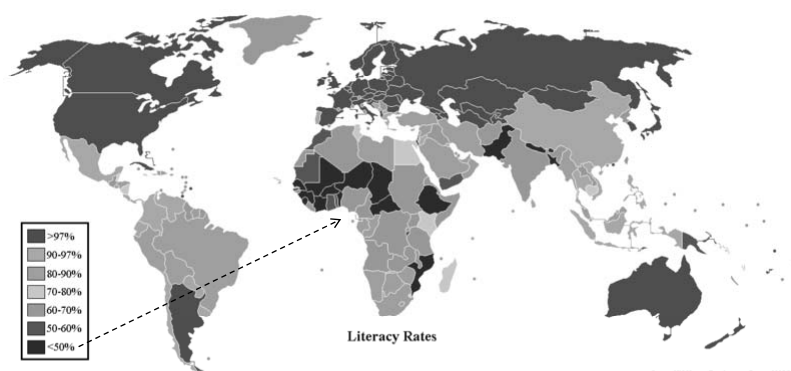
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III.人口素質的變遷

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World literacy map 識字率分布圖

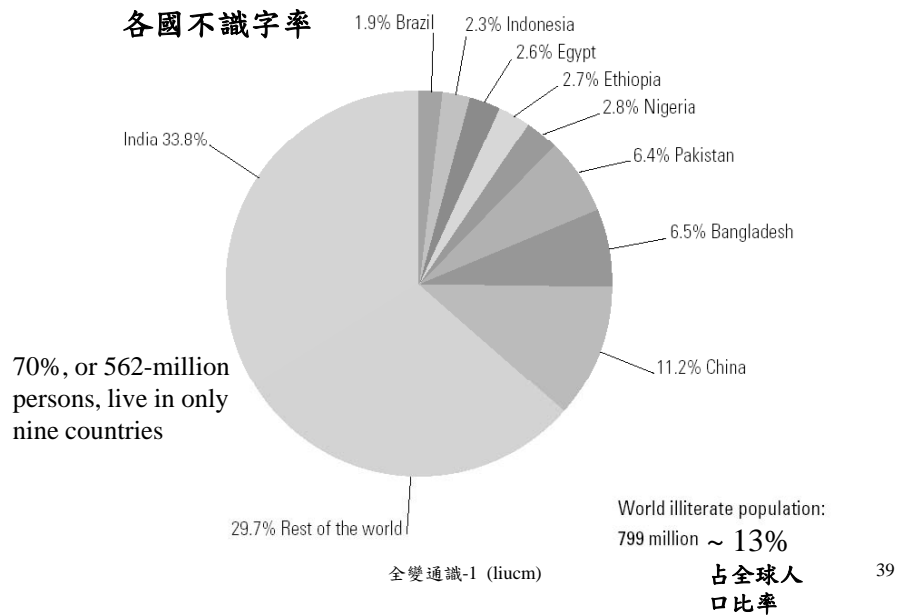


http://en.wikipedia.org/wiki/Image:World_literacy_map_UNHD_2007_2008.png

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World adult illiterate population, percentage by country, 2000-2004



high literacy rates but large absolute numbers of illiterates

高識字率國家，卻有大量不識字的民眾！

China (中國), with a literacy rate of 91%, but also Indonesia (印尼) and Brazil (巴西), both with a literacy rate of 88%

識字率

Adult literacy rates in five high-population countries by gender, 1990–1994 and 2000–2004

| | Men | | | Women | | |
|-----------|--------------------|-----------|----------------------------|--------------------|-----------|----------------------------|
| | Literacy rates (%) | | Change (percentage points) | Literacy rates (%) | | Change (percentage points) |
| | 1990-1994 | 2000-2004 | | 1990-1994 | 2000-2004 | |
| Brazil | 80.1 | 88.0 | 7.9 | 79.7 | 88.3 | 8.6 |
| China | 87.0 | 95.1 | 8.1 | 68.1 | 86.5 | 18.4 |
| India | 61.6 | ... | ... | 33.7 | ... | ... |
| Indonesia | 88.0 | 92.5 | 4.5 | 75.3 | 83.4 | 8.1 |
| Pakistan | 52.8 | 53.4 | 0.6 | 23.8 | 28.5 | 4.7 |

十年來女性地位大幅提高，識字率顯著上升。
但是，女性仍是受到壓抑的族群。

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Youth literacy (15–24) by gender and region, 2000–2004

年青人識字比率

| | Youth literacy rates | | | | Youth illiterates | |
|----------------------------------|----------------------|----------|------------|---------------|-------------------|----------|
| | Total | % Male 男 | % Female 女 | GPI (F/M) 女/男 | Total (thousands) | % female |
| World | 88 | 91 | 84 | 0.92 | 136710 | 63 |
| Developing countries | 85 | 89 | 81 | 0.91 | 136052 | 63 |
| Developed countries 開發國 | 100 | 100 | 100 | 1.00 | 354 | 49 |
| Countries in transition | 99 | 99 | 99 | 1.00 | 304 | 50 |
| Sub-Saharan Africa | 77 | 81 | 72 | 0.89 | 31135 | 59 |
| Arab states | 78 | 84 | 72 | 0.85 | 12946 | 64 |
| Central Asia | 98 | 98 | 98 | 1.00 | 257 | 50 |
| East Asia and the Pacific | 98 | 98 | 97 | 0.99 | 7446 | 58 |
| South and West Asia | 72 | 82 | 63 | 0.77 | 79344 | 65 |
| Latin America and the Caribbean | 96 | 95 | 96 | 1.01 | 4589 | 46 |
| North America and Western Europe | 100 | 100 | 100 | 1.00 | 203 | 49 |
| Central and Eastern Europe | 99 | 99 | 98 | 0.99 | 790 | 69 |

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我國

1997年

15歲以上不識字男(1.91%)女(8.93%)全部(5.34%)

2007年

15歲以上不識字男(0.60%)女(4.15%)全部(2.37%)

2009年

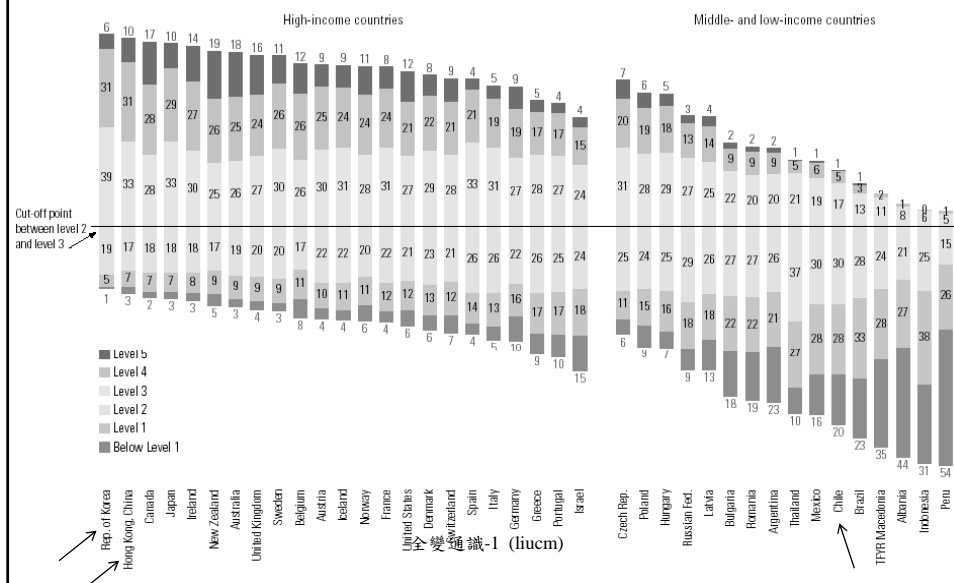
15歲以上不識字男(0.51%)女(3.81%)全部(2.13%)

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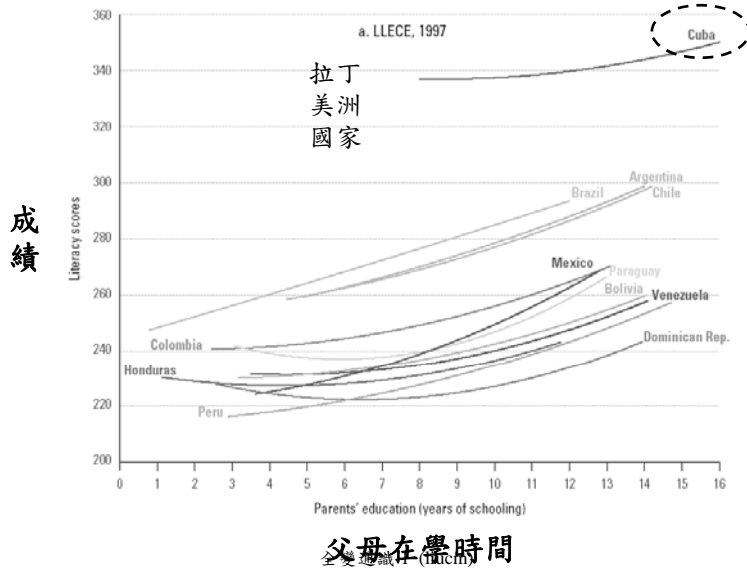
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Percentage of 15-year-old students in five proficiency levels for reading, 2000–2002

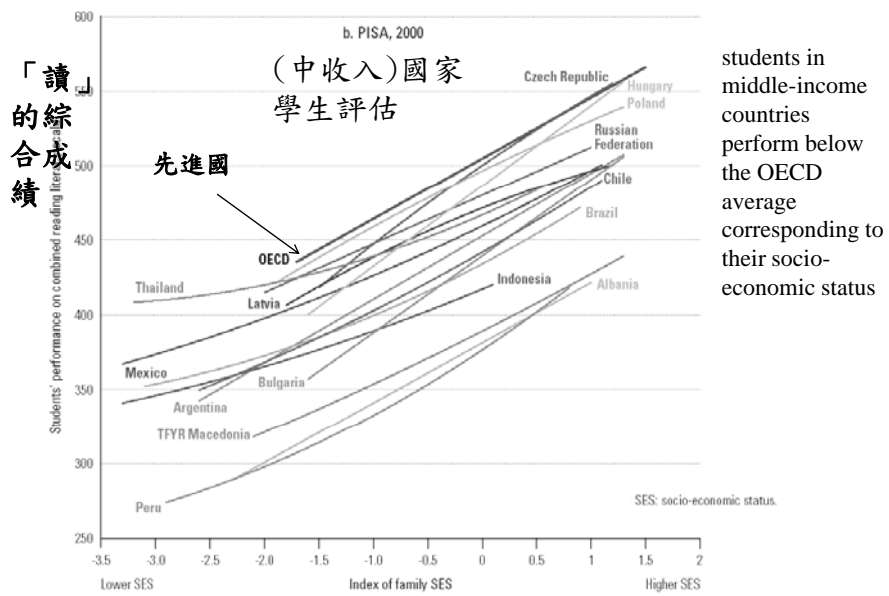
讀能力



Socio-economic gradients for literacy performance

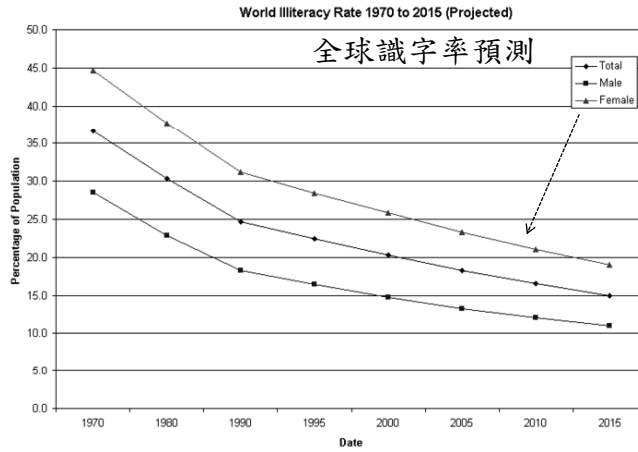


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SES: (家庭)社會與經濟狀態

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<http://en.wikipedia.org/wiki/Image:World-Literacy-Rate-1970to2015.TC.png>

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Table 1 Percentage of students at each proficiency level on the science scale

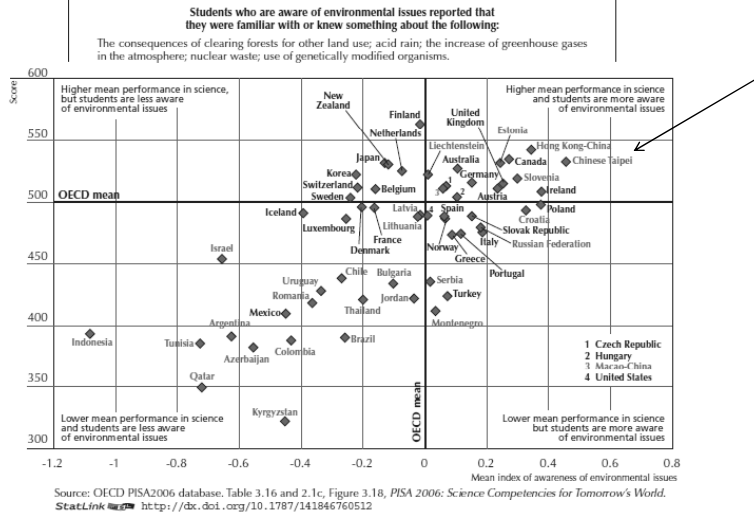
| | Proficiency levels in science | | | | | | |
|--------------------|-------------------------------|---------|---------|---------|---------|---------|---------|
| | Below Level 1 | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 | Level 6 |
| Finland | 0.3 | 3.8 | 13.0 | 29.1 | 32.2 | 17.0 | 3.9 |
| Estonia | 1.0 | 6.7 | 21.0 | 33.7 | 26.2 | 10.1 | 1.4 |
| Hong Kong, China | 1.7 | 7.0 | 16.9 | 28.7 | 29.7 | 13.9 | 2.1 |
| Canada | 2.2 | 7.8 | 19.1 | 28.8 | 27.7 | 12.0 | 2.4 |
| Macau, China | 1.4 | 8.9 | 26.0 | 35.7 | 22.8 | 5.0 | 0.3 |
| Korea | 2.5 | 8.7 | 21.2 | 31.8 | 25.5 | 9.2 | 1.1 |
| Chinese Taipei | 1.9 | 9.7 | 18.6 | 27.3 | 27.8 | 13.9 | 1.7 |
| Japan | 3.2 | 8.9 | 18.5 | 27.5 | 27.0 | 12.4 | 2.6 |
| Australia | 3.0 | 9.8 | 20.2 | 27.7 | 24.6 | 11.8 | 2.8 |
| Lithuania | 2.6 | 10.1 | 21.0 | 28.7 | 25.7 | 10.0 | 2.7 |
| Netherlands | 2.3 | 10.7 | 21.1 | 26.9 | 25.8 | 11.5 | 1.7 |
| New Zealand | 4.0 | 9.7 | 19.7 | 25.1 | 23.9 | 13.6 | 4.0 |
| Slovenia | 2.8 | 11.1 | 23.1 | 27.6 | 22.5 | 10.7 | 2.7 |
| Hungary | 2.7 | 12.1 | 26.0 | 31.1 | 21.0 | 6.2 | 0.6 |
| Germany | 5.1 | 11.8 | 21.8 | 27.9 | 23.6 | 10.0 | 1.8 |
| Ireland | 3.5 | 12.0 | 24.0 | 29.7 | 21.4 | 8.3 | 1.3 |
| Czech Republic | 3.5 | 12.1 | 23.4 | 27.8 | 21.7 | 9.8 | 1.8 |
| Switzerland | 4.5 | 11.6 | 21.8 | 38.7 | 23.5 | 9.1 | 1.4 |
| Austria | 4.3 | 12.0 | 21.8 | 28.3 | 23.6 | 8.8 | 1.2 |
| Sweden | 3.8 | 12.6 | 25.7 | 29.5 | 21.1 | 6.8 | 1.1 |
| United Kingdom | 4.8 | 11.9 | 21.8 | 25.9 | 21.8 | 10.9 | 2.9 |
| Croatia | 3.0 | 14.0 | 29.3 | 31.0 | 17.7 | 4.6 | 0.5 |
| Poland | 3.2 | 13.8 | 27.5 | 29.4 | 19.1 | 6.1 | 0.7 |
| Belgium | 4.8 | 12.7 | 20.8 | 27.6 | 24.5 | 9.1 | 1.0 |
| Latvia | 3.6 | 11.8 | 29.0 | 32.9 | 16.6 | 3.8 | 0.3 |
| Denmark | 4.1 | 14.1 | 26.0 | 29.1 | 19.5 | 6.1 | 0.7 |
| Spain | 4.7 | 14.9 | 27.1 | 30.7 | 17.9 | 4.5 | 0.3 |
| Slovak Republic | 5.2 | 15.0 | 28.0 | 28.1 | 17.9 | 5.2 | 0.6 |
| Lithuania | 4.3 | 16.0 | 27.4 | 29.8 | 17.5 | 4.5 | 0.4 |
| Iceland | 5.8 | 14.7 | 25.9 | 28.3 | 19.0 | 5.6 | 0.7 |
| Norway | 5.9 | 15.2 | 27.3 | 28.5 | 17.1 | 5.5 | 0.6 |
| France | 6.6 | 14.5 | 22.8 | 27.2 | 20.9 | 7.2 | 0.8 |
| Luxembourg | 6.2 | 15.8 | 25.4 | 28.6 | 18.1 | 5.4 | 0.5 |
| Russian Federation | 5.7 | 17.0 | 30.7 | 28.3 | 15.1 | 3.7 | 0.5 |
| Cyprus | 7.2 | 16.9 | 28.9 | 29.4 | 14.2 | 3.2 | 0.2 |
| United States | 2.6 | 16.8 | 24.2 | 24.0 | 18.3 | 7.5 | 1.5 |
| Portugal | 5.8 | 18.7 | 28.8 | 28.8 | 14.7 | 3.0 | 0.1 |
| Italy | 2.8 | 18.0 | 27.6 | 27.4 | 15.1 | 4.2 | 0.4 |
| Greece | 18.9 | 21.7 | 24.9 | 20.9 | 15.8 | 4.4 | 0.8 |
| Bertha | 11.9 | 28.6 | 32.3 | 21.8 | 6.6 | 0.8 | 0.0 |
| Chile | 13.1 | 26.7 | 29.9 | 20.1 | 8.4 | 3.8 | 0.1 |
| Uruguay | 16.7 | 25.4 | 29.8 | 19.7 | 6.9 | 1.3 | 0.1 |
| Bulgaria | 18.3 | 24.3 | 25.2 | 18.8 | 10.3 | 2.6 | 0.4 |
| Jordan | 16.2 | 28.2 | 30.8 | 18.7 | 5.8 | 0.6 | 0.0 |
| Thailand | 12.6 | 33.5 | 33.2 | 16.3 | 4.0 | 0.4 | 0.0 |
| Turkey | 12.9 | 33.7 | 31.3 | 15.1 | 6.2 | 0.9 | 0.0 |
| Romania | 16.0 | 30.9 | 31.8 | 16.6 | 4.7 | 0.5 | 0.0 |
| Montenegro | 17.1 | 31.0 | 31.0 | 14.9 | 3.6 | 0.1 | 0.0 |
| Mexico | 18.2 | 32.8 | 30.8 | 14.8 | 3.2 | 0.3 | 0.0 |
| Argentina | 28.3 | 27.9 | 23.6 | 13.6 | 4.1 | 0.4 | 0.0 |
| Ecuador | 26.7 | 34.0 | 27.2 | 10.6 | 1.9 | 0.2 | 0.0 |
| Brazil | 27.9 | 33.1 | 23.8 | 11.3 | 3.4 | 0.5 | 0.0 |
| Indonesia | 20.3 | 41.1 | 27.1 | 9.5 | 1.4 | 0.0 | 0.0 |
| Yunata | 27.7 | 35.1 | 25.0 | 10.2 | 1.9 | 0.1 | 0.0 |
| Azerbaijan | 19.4 | 53.1 | 22.4 | 4.7 | 0.4 | 0.0 | a |
| Qatar | 47.6 | 31.5 | 11.9 | 5.0 | 1.6 | 0.1 | 0.0 |
| Kyrgyzstan | 58.2 | 28.2 | 10.0 | 2.9 | 0.7 | 0.0 | a |

<http://www.pisa.oecd.org/dataoecd/15/13/39725224.pdf>

Source: OECD PISA 2006 database, Table 2.1a, PISA 2006: Science Competencies for Tomorrow's World. Countries are ranked in descending order of percentage of students at Levels 2, 3, 4, 5 and 6. [Source: www.oecd.org http://dx.doi.org/10.1787/43184475532](http://dx.doi.org/10.1787/43184475532)

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Figure 4 Performance in science and awareness of environmental issues



全變通識-1 (liucm)

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1. 道德水準無法衡量
2. 收入低的國家教育水準普遍偏低，但非絕對偏低，如古巴就非常重視教育。
3. 教育水平高的國家並非收入高的國家，如南韓。
4. 以全球角度來觀察，人的「質」隨著時代與觀念的演進，而不斷提升，雖然「量」仍在增加，但是「結構」也會不斷演進。這樣的發展，應該算是正面的，雖然是比較緩慢。

全變通識-1 (liucm)

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討論題綱：

- a. 老化是否伴隨競爭力衰退？
- b. 你會參加「饑餓三十」活動嗎？

註：平時討論成績佔總成績的 40%：依每次參加分組(約五~六人一組)討論的過程與結論評分。

全變通識-1 (liucm)

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