

### Characteristics of World Class Universities

A knowledge based economy in a country, needs to have an appropriate economic and institutional regime, a strong human capital base, a dynamic information infrastructure and an efficient national innovation system [1998/99 world development report].

University Education (Tertiary Education) is central to this framework but its role is very crucial in building strong human capital base and efficient national innovation system. Within this university education, research universities play a critical role in training the professionals, high-level specialists, scientists, and researchers needed by the economy and in generating new knowledge in support of national innovation systems (World Bank 2002). Such of those **universities which produce transformational research outputs and develop nation's competitiveness in the global knowledge economy are World-Class Universities.**

The world class universities play key roles in creating and disseminating knowledge, educating a highly skilled workforce for technological and intellectual leadership, and serving the needs of society. In the past decade, the development of world-class universities has been a central policy concern of various stakeholders across the globe, and an intense debate among the world academic community. It was in this context that Centre for World-Class Universities of Shanghai Jiao Tong University initiated the biennial International Conference on World-Class Universities in 2005 (WCU-1). Subsequently, the 2nd, 3rd and 4th International Conferences on World-Class Universities were convened in 2007, 2009 and 2011 respectively (WCU-2, WCU-3 and WCU-4). The conferences have gathered and attracted hundreds of university administrators, government officials and leading scholars worldwide to discuss various issues related to World-Class Universities

According to professor Hsiou-Hsia Tai, National Chiao Tung University, some of the important features of world-class universities are [ <http://www.shanghairanking.com/wcu/wcu1/Tai.pdf>]

1. The world-class universities are public universities except those in the US, which cover both public and private universities. Most of these universities are highly internationalised **comprehensive universities with a wide range of subject coverage**
2. Although research quantity of the top-ranking universities is important, the crucial factor which makes the institutions prominent internationally is **the quality and significance of academic research**
3. Most of the world-class universities have medical schools. Institutions that have a significant commitment **to biomedical research science tend to have a competitive advantage** than institutions that are more committed to other subject areas.
4. Except the private American universities, most of the world-class universities are relatively large, with average **student number ranging from 20,000 to 34,000** and average **faculty number ranging from 2400- 3000.**
5. Except the private American Universities, **the number of undergraduate students is much larger than that of graduate students**, with the undergraduate ratio ranging from 1.8:1 to 5.7:1
6. Except the public American universities, the student **faculty ratio is relatively low in most universities, ranging from 6.0:1 to 10.8:1**
7. Most universities have sufficient administrative and technical personnel to support teaching and research. **The faculty staff ratio ranges from 0.3:1 to 1.1:1**
8. What really distinguishes the top 10 private American universities, which are ranked best in the world from the rest of top-ranking institutions is the enormous funds available. The

average annual expenditure per student of those institutions reach **a hard to challenge USD 148000, while the others range from USD 30000 to USD 52000**

**(The pdf attached here)**

Although some of the world's top-ranked institutions such as Harvard, Cambridge and Oxford are hundreds of years old, a series of case studies of successful world-class research universities, prepared by the World Bank, shows that a faster and more effective approach to achieving world-class status is to establish a new institution [University World News-issue 00331].

World Bank study, titled The Road to Academic Excellence: The making of world class research universities, found that new universities can grow into top quality research institutions within two or three decades when academic talent, financial resources and governance - particularly autonomy and academic freedom - are present from the start. Top-performing research universities share three common characteristics - a high concentration of talented academics and students, significant budgets and strategic vision and leadership. But setting up top universities can cost millions of dollars. For example, in late 2007, Saudi Arabia announced plans for a new US\$10 billion graduate research university; Pakistan plans to spend \$750 million for each of its new universities of engineering, science, and technology during the next few years; and the school of medicine established by Cornell University in Qatar in 2002 cost \$750 million.

World-class universities thrive in environments that foster competitiveness, unrestrained scientific inquiry and academic freedom, critical thinking, innovation and creativity. In addition, institutions that have complete autonomy are more flexible because they are not bound by cumbersome bureaucracies and can quickly respond to the demands of a rapidly changing global market.

**Prof. S.R. Shankapal**



# *The Features of World-Class Universities*

***Hsiou-Hsia Tai***

Professor, Institute of Education

Associate Dean, College of Humanities and Social Sciences

National Chiao Tung University

Hsin-chu, Taiwan



- ✦ Introduction
- ✦ Research Method
- ✦ Top 10 Private American Universities
- ✦ Top 10 Public American Universities
- ✦ Top 10 British Universities
- ✦ 10 European Continent Universities
- ✦ Top 7 Asian-Pacific Universities
- ✦ A Summary of Institutional Characteristics



# *Introduction*

- ✦ The article aims to address the question of “What is a world-class university?” by analyzing the features shared by most of the top-ranking universities in various areas of the world.



# Research Method

- World-class universities:  
the top 100 universities ranked by Shanghai Jiao Tong University
- Top 100 universities by region and country

Region	Country	Number
North America	US	51
	Canada	4
Europe	UK	11
	Germany	7
	France, Sweden	4×2
	Switzerland	3
	Netherlands	2
	Italy, Denmark, Austria, Finland, Norway, Russia, (Israel)	1×7
Asian Pacific	Japan	5
	Australia	2



- ✦ The Shanghai ranking has a rather complete set of data about the research performance of the high-quality universities.
- ✦ This study pays attention to other aspects of those universities including: total enrollment, undergraduate graduate ratio, number and percentage of international students, number of faculty, student faculty ratio, number of administrative and technical staff, faculty staff ratio, annual revenue and annual expenditures and annual revenue/expenditures per student.



- ❖ Due to the inadequacy of institutional data collected by national bodies, the study gathers data mainly from the websites of individual universities.
- ❖ To make comparison of top-ranking universities in various countries/regions more feasible, out of the top 100 universities, the study focuses on the top 10 private and top 10 public universities in the US, top 10 in the UK and 10 in European continent and the top 7 in the Asian-Pacific region.





# Top 10 Private American Universities

	Harvard Univ.	Stanford Univ.	MIT	Caltech	Princeton Univ.	Columbia Univ.	Chicago Univ.	Yale Univ.	Cornell Univ.	Univ Pennsylvania
Has a medical school	yes	yes	no	no	no	yes	yes	yes	yes	yes
<u>Total enrollment</u>	<u>19,789</u>	<u>14,454</u>	<u>10,320</u>	<u>2,172</u>	<u>6,673</u>	<u>23,650</u>	<u>13,400</u>	<u>11,359</u>	<u>20,334</u>	<u>19,265</u>
Undergraduate	7,539	7,800	4,136	896	4,695	8,959	4,400	5,242	13,655	10,047
graduate	12,250	6,654	6,184	1,276	1,978	14,691	9,000	6,117	6,679	9,218
Undergraduate/graduate ratio	0.6:1	1.2:1	0.7:1	0.7:1	2.4:1	0.6:1	0.5:1	0.9:1	2.0:1	1.1:1
No. of international students	3,546	2,971	2,724	--	1,202	4,065	--	1,817	3,253	2,440
%of international students	18	21	26	--	18	17	--	16	16	13
no. of faculty (include research faculty)	2,000	1,749	1,581	1,147	1,146	3,224	2,160	3,236	3,241	4,238
Student faculty ratio	9.9:1	8.3:1	6.5:1	1.9:1	5.8:1	7.3:1	6.2:1	3.5:1	6.3:1	4.5:1
No. of staff	--	8,788	8,199	2,671	5,291	9,198	12,460	8,005	9,925	13,025
Faculty staff ratio	--	0.2:1	0.2:1	0.4:1	0.2:1	0.4:1	0.2:1	0.4:1	0.3:1	0.3:1
Annual revenue (US\$ billion)	2.6	2.3	1.8	--	0.9	2.1	1.1	--	1.9	--
Annual revenue per student (×US\$000)	131	159	174	--	135	89	82	--	93	--
Annual expenditures (US\$ billion)	2.6	2.3	1.8	--	0.9	2.1	--	1.7	1.9	4.3
Annual expenditures per student (×US\$000)	131	189	174	--	135	89	--	150	93	223



# Top 10 Public American Universities

	UC – Berkeley	UC – San Diego	UC – Los Angeles	UC – San Francisco	Univ Wisconsin - Madison	Univ Michigan –Ann Arbor	Univ Washington - Seattle	Univ Illinois - Urbana Champaign	Univ Minnesota – Twin Cities	Univ Colorado - Boulder
Has a medical school	no	yes	yes	yes	yes	yes	yes	no	yes	no
Total enrollment	33,076	24,668	38,598	2,800	41,588	36,047	42,757	40,360	50,954	29,258
Undergraduate	23,206	19,872	25,715	--	28,583	24,828	30,921	29,294	34,281	24,710
graduate	9,870	4,796	12,883	--	13,005	11,219	11,836	11,066	16,673	4,548
Undergraduate/ graduate ratio	2.4:1	4.1:1	1.2:1	--	2.2:1	2.2:1	2.6:1	2.6:1	2.1:1	5.4:1
No. of international students	--	--	--	--	3,571	--	--	2,189	3,663	1,170
% of international students	--	--	--	--	9	--	--	5	7	4
no. of faculty (include research faculty)	1,889	--	3,326	--	2,060	5,007	3,360	3,312	--	2,090
Student faculty ratio	17.5:1	--	11.6:1	--	20.1:1	7.2:1	12.7:1	12.2:1	--	14:1
no. of staff	20,399	22,000	--	--	13,710	17,569	20,102	4,588	--	--
Faculty staff ratio	0.1:1	--	--	--	0.2:1	0.3:1	0.2:1	0.7:1	--	--
Annual revenue (US\$ billion)	0.9	0.6	0.8	0.4	1.7	1.2	2.2	--	1.3	0.8
Annual revenue per student (xUS\$000)	28	26	21	169	41	32	51	--	27	27
Annual expenditures (US\$ billion)	1.5	1.8	3.2	--	--	1.2	2.6	1.3	2.1	0.8
Annual expenditures per student (xUS\$000)	44	74	83	--	--	32	61	33	41	27



# Top 10 British Universities (1/2)

	Univ Cambridge	Univ Oxford	Imperial College London	Univ college London	Univ Edinburgh
Total enrollment	17,781	18,536	10,721	18,337	22,827
Undergraduate	11,751	11,938	7,483	11,669	16,963
graduate	5,967	6,598	3,238	6,668	5,864
Has a medical school	yes	yes	yes	yes	yes
Undergraduate/graduate ratio	1.97:1	1.81:1	2.3:1	1.75:1	2.89:1
No. of international students	2,997	4,600	2,186	4,723	2,958
% of international students	17	25	20	26	13
no. of faculty (include research faculty)	--	1,346	2,856	4,080	--
Student faculty ratio	--	13.8:1	3.8:1	4.5:1	--
no. of staff	--	5,837	4,886	--	--
Faculty staff ratio	--	0.2:1	0.5:1	--	--
Annual revenue (US\$ billion)	0.9	0.9	0.8	0.9	0.7
Annual revenue per student (×US\$000)	50	47	72	49	31
Annual expenditures (US\$ billion)	0.9	0.8	0.8	0.9	0.7
Annual expenditures per student (×US\$000)	50	45	71	49	30



# Top 10 British Universities (2/2)

	Univ Bristol	Univ Sheffield	Univ Manchester	Univ Nottingham	Univ Birmingham
<u>Total enrollment</u>	<u>16,140</u>	<u>19,587</u>	<u>25,746</u>	<u>29,856</u>	<u>24,900</u>
Undergraduate	10,935	16,070	--	--	17,836
graduate	5,205	3,517	--	--	7,064
Has a medical school	yes	yes	yes	yes	yes
Undergraduate/graduate	2.10:1	4.57:1	--	--	2.52:1
No. of international students	--	3,820	4,489	--	4,303
% of international students	--	20	17	--	17
no. of faculty (include research faculty)	2,405	1,296	--	2,415	--
Student faculty ratio	6.7:1	15.1:1	--	12.4:1	--
no. of staff	1,284	4,273	--	2,835	--
Faculty staff ratio	1.9:1	0.3:1	--	0.9:1	--
Annual revenue (US\$ billion)	0.5	0.5	0.7	0.6	0.6
Annual revenue per student (xUS\$000)	29	29	27	19	22
Annual expenditures (US\$ billion)	0.5	--	0.6	0.6	0.5
Annual expenditures per student (xUS\$000)	29	---	26	19	21



# 10 European Continent Universities (1/2)

	<b>ETH Zurich</b>	<b>Univ Utrecht</b>	<b>Univ Paris 06</b>	<b>Univ Paris 11</b>	<b>Univ Leiden</b>
<u>Total enrollment</u>	<u>12,626</u>	<u>24,628</u>	<u>30,000</u>	<u>30,000</u>	<u>16,614</u>
Undergraduate	9,704	--	19,800	21,200	--
graduate	2,900	--	10,200	8,800	--
Has a medical school	no	yes	yes	yes	yes
Undergraduate/graduate	3.32:1	--	1.94:1	2.41:1	--
No. of international students	5,525	1,000	4,250	3,200	1,366
%of international students	20	4	14	11	8
no. of faculty (include research faculty)	--	2,883	4,000	1,800	1,423
Student faculty ratio	--	8.5:1	7.5:1	16.6:1	11.7:1
no. of staff	5,535	5,436	3,000	3,481	2,090
Faculty staff ratio	--	0.5:1	0.8:1	1.9:1	1.5:1
Annual revenue (US\$ billion)	0.8	0.8	--	0.6	0.5
Annual revenue per student (xUS\$000)	64	34	--	19	32
Annual expenditures (US\$ billion)	0.9	0.8	--	--	0.5
Annual expenditures per student (xUS\$000)	74	34	--	--	32



# 10 European Continent Universities (2/2)

	Univ Helsinki	Uppasala Univ	Lund Univ	Stockholm Univ	Univ Bonn
Total enrollment	38,454	42,500	27,104	37,225	30,000
Undergraduate	31,304	40,000	23,646	35,000	--
graduate	7,150	2,500	3,458	2,225	--
Has a medical school	yes	yes	yes	yes	yes
Undergraduate/graduate	4.38:1	--	6.84:1	15.73:1	--
No. of international students	1,266	--	615	--	5,000
%of international students	3	--	2	--	6
no. of faculty (include research faculty)	3,546	3,850	2,825	2,940	3,530
Student faculty ratio	10.8:1	11.4:1	9.6:1	12.7:1	8.5:1
No. of staff	3,899	2,150	3,179	1,260	5,200
Faculty staff ratio	0.9:1	1.8:1	0.9:1	2.3:1	0.7:1
Annual revenue (US\$ billion)	0.6	0.6	0.7	--	--
Annual revenue per student (xUS\$000)	16	14	27	--	--
Annual expenditures (US\$ billion)	0.6	0.6	0.7	--	0.4
Annual expenditures per student (xUS\$000)	16	14	27	--	14



# Top 7 Asian-Pacific Universities

	Tokyo Univ	Kyoto Univ	Osaka Univ	Tohoku Univ	Nagoya Univ	Australian Nat'l Univ	Univ Melbourne
Has a medical school	yes	yes	yes	yes	yes	yes	yes
<u>Total enrollment</u>	<u>28,350</u>	<u>22,103</u>	<u>19,931</u>	<u>17,247</u>	<u>16,537</u>	<u>10,152</u>	<u>32,869</u>
Undergraduate	15,466	13,275	12,229	10,616	10,233	7,370	25,074
graduate	12,884	8,828	7,702	6,631	6,304	2,782	7,795
Undergraduate/graduate ratio	1.2:1	1.4:1	1.6:1	1.6:1	1.6:1	2.7:1	3.2:1
No. of international students	2,085	1,253	1,048	1,054	1,194	2,096	7,619
% of international students	7	6	5	6	7	21	23
no. of faculty (include research faculty)	4,165	2,957	2,436	2,589	1,831	1,246	2,362
Student faculty ratio	6.8:1	7.5:1	8.2:1	6.7:1	9.0:1	8.2:1	13.9:1
No. of staff	3,357	2,345	2,028	2,359	1,703	2,046	3,319
Faculty staff ratio	1.2:1	1.3: 1	1.2: 1	1.1: 1	1.1: 1	0.6:1	0.7:1
Annual revenue (US\$ billion)	0.7	0.4	0.5	0.4	0.4	0.4	0.7
Annual revenue per student (xUS\$000)	26	20	23	24	20	39	21
Annual expenditures (US\$ billion)	2.6	1.3	1.1	2.4	0.9	0.4	0.7
Annual expenditures per student (xUS\$000)	78	58	56	67	54	41	20

# A Summary of Institutional Characteristics

	Average of Top10 American private universities	Average of Top10 American public universities	Average of Top10 British universities	Average of 10 European universities	Average of Top 7 Asian-Pacific universities	National Taiwan University
Total Score	67.0	49.8	40.1	30.7	34.9	18.0
Alumni	61.9	31.5	34.0	28.9	20.0	15.4
Award	66.7	33.4	32.4	23.4	12.9	0.0
HiCi	69.8	57.9	35.0	22.2	29.7	8.7
N&S	61.1	49.6	33.9	24.9	32.0	8.8
SCI & SSCI	66.2	68.3	54.8	49.9	66.0	52.6
Size	53.1	28.0	38.5	25.0	33.5	17.3
% of having a medical school	70	70	100	80	100	yes
Student enrollment	14,142	34,011	20,443	28,915	21,027	29,830
Undergraduate/graduate ratio	1.1:1	2.8:1	2.5:1	5.7:1	1.8:1	1.5 : 1
% of international students	18.1	--	19.4	8.5	11	1
no. of faculty (include research faculty)	2,372	3,006	2,400	2,978	2,506	1,840
Student faculty ratio	6.0:1	13.6:1	9.4:1	10.8:1	7.6:1	16.2 : 1
Faculty staff ratio	0.3:1	0.3:1	0.8:1	1.3:1	1.1:1	1.6 : 1
Annual revenue per student (xUS\$000)	127	47	38	29	24	12
Annual expenditures per student (xUS\$000)	148	50	38	30	52	12





## *A Summary of Institutional Characteristics*

- ❖ **1. The world-class universities are public universities except those in the US, which cover both public and private universities. Most of these universities are highly internationalized comprehensive universities with a wide range of subject coverage.**



**2. Although research quantity of the top-ranking universities is important, the crucial factor which makes the institutions prominent internationally is the quality and significance of academic research.**



**3. Most of the world-class universities have medical schools. Institutions that have a significant commitment to biomedical science tend to have a competitive advantage than institutions that are more committed to other subject areas.**



- 4. Except the private American universities, most of the world-class universities are relatively large, with average student number ranging from 20,000 to 34,000 and average faculty number ranging from 2,400 to 3,000.**
  
- 5. Except the private American universities, the number of undergraduate students is much larger than that of graduate students, with the undergraduate graduate ratio ranging from 1.8:1 to 5.7:1.**
  
- 6. Except the public American universities, the student faculty ratio is relatively low in most universities, ranging from 6.0:1 to 10.8:1.**



**7. Most universities have sufficient administrative and technical personnel to support teaching and research. The faculty staff ratio ranges from 0.3:1 to 1.1:1.**



**8. What really distinguishes the top 10 private American universities, which are ranked best in the world, from the rest of top-ranking institutions is the enormous funds available. The average annual expenditures per student of those institutions reach a hard-to-challenge US\$148,000, while the others range from US\$30,000 to US\$52,000 .**