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A first approach to the classification of the top 500 world universities by their disciplinary characteristics using scientometrics

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In this study, the top 500 world universities are classified into 21 types according to their disciplinary characteristics using clustering method. The indicators used to represent the disciplinary characteristics of an institution are the proportion of publications in six broader disciplinary areas: Arts/Humanities & Social Sciences, Natural Sciences & Mathematics, Engineering/Technology & Computer Sciences, Life Sciences, Clinical Medicine, and Interdisciplinary & Multidisciplinary Sciences. Institutions have been classified into types of having focus in a disciplinary group, having priority in a disciplinary group, having orientation in a disciplinary group, and balanced. The distribution of different types of institutions with respect to countries and ranks are analyzed.

Introduction

Differences between various types of universities could be huge. With the globalization of higher education, universities are facing increasing international competition. It would be desirable for universities to compare themselves with their international partners or rivals with similar characteristics.

There exist many types of classification of higher education institutions in various countries. One common type is classification by the missions of higher education institutions; a typical example is the Carnegie Classification of Higher Education

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Institutions in US.[1] Another familiar type is classification by the characteristics of higher education institutions, such as comprehensive and single disciplinary, public and private. Nevertheless, there has been no classification for world universities.

The purpose of this paper is to classify top world universities by their disciplinary characteristics using scientometrics.

Methodology

Selection of sample institutions

Sample institutions in this study are the top 500 world universities ranked by the Institute of Higher Education, Shanghai Jiao Tong University.[2] These 500 institutions are located in 35 countries. US has a dominant position, with 85% of the top 20 institutions, 51% of the top 100 institutions, 45% of the top 200 institutions, and 34% of the 500 institutions. United Kingdom performs reasonably well, with about 10% of the top institutions in all rank ranges. Other countries with 10 or more top 500 universities include: Germany (43), Japan (36), Canada (23), Italy (23), France (22), China (included Hong Kong and Taiwan) (16), Australia (14), Netherlands (12), Sweden (10). Detailed information about the methodology of the ranking and its limitations could be found in Ref. 3.

Choice of indicators

An institution's disciplinary characteristics may be indicated by its publications in various disciplines. In other words, institutions with similar disciplinary characteristics should have similar percentage of articles published in various disciplines. In this paper, the percentages of articles in disciplinary groups are chosen as the indicators for clustering analysis.

Six disciplinary groups

Each article published by an institution is assigned into one of the six disciplinary groups: Arts/Humanities & Social Sciences (HSS), Natural Sciences & Mathematics (SCI), Engineering/Technology & Computer Sciences (ENG), Life Sciences (LIFE), Clinical Medicine (MED), and Interdisciplinary & Multidisciplinary Sciences (INTER). If an article is published in a multi-assigned journal (which is assigned to more than one ISI category), it is divided into related groups.

Calculation of the percentage of articles

The percentage of articles in a disciplinary group is calculated by dividing the number of articles in the group with the total number of articles of an institution. The six indicators would then be P_{HHS}, P_{SCI}, P_{ENG}, P_{LIFE}, P_{MED} and P_{INTER}.

Similarity measures

Clustering method is based on the measure of similarity and dissimilarity of cases or indicators. For case clustering, the similarity and dissimilarity among cases are the distances between them. Shorter distance indicates that cases are more similar. In this study, the Squared Euclidean Distance, defined as the sum of the squared distances over all indicators, has been used for analysis. The distance between institution x and y is calculated as:

$$d(x, y) = \sum (P_{x \cdot i} - P_{y \cdot i})^2$$

where $P_{x \cdot i}$ and $P_{y \cdot i}$ are the value of indicator P_i for institution x and institution y respectively. The difference between distances is then used to classify institutions.

Clustering approach

There are dozens of mathematical methods that could be used to arrive at a classification scheme.[4] A report[5] submitted to National Center for Educational Statistics (USA) used the K-means cluster analysis to create a classification system for 2-year colleges in United States. The report also reviewed and compared different quantitative approaches in classifying higher education institutions. In this study, we developed a new but relatively simple classification model. By the setup of a series of reference institutions that represent different disciplinary characteristics, all institutions were examined whether they have some predominance in one or more disciplinary group and what the degree of predominance is.

Data sources

The data used in this study is obtained by online searching of the databases of ISI Thomson Corporation, including Arts & Humanities Citation Index (A&HCI), Science Citation Index Expanded (SCIE), and Social Sciences Citation Index (SSCI). The number of publications indexed in the above databases in 2004 is used. Only publication of "Article" type is considered.

Clustering process

The flow chart of the clustering process is shown in Figure 1. Firstly, the institutions with disciplinary focuses are identified. The rest of institutions are then examined for disciplinary priorities, followed by examination for disciplinary orientation. The institutions left after the three clustering steps are defined as Balanced.

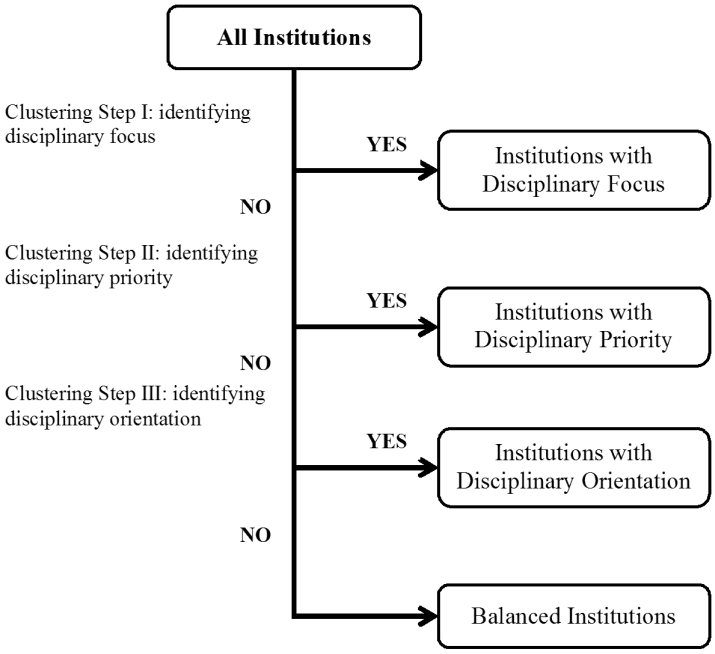

Figure 1. Flow chart of classifying institutions by clustering method

Definition of reference institutions

In order to start a clustering process, values of the indicators for a set of reference institutions have to be determined first. For the first round of clustering process, five extreme situations of single disciplinary institutions are assumed as the reference of each disciplinary group; they publish their articles in only one disciplinary group. Another reference point is the most comprehensive institution representing the average of all the 500 institutions. The values of six indicators for the reference institutions are shown in Table 1.

Inter-disciplinary reference institution

Interdisciplinary research has become more and more important. Nevertheless, the highest percentage of articles in inter-disciplinary sciences is only about 24%. In addition, it's very difficult to define what an interdisciplinary institution is. Therefore, no reference institution is defined for inter-disciplinary group; there will be no inter-disciplinary type of institution classified.

Table 1. Values of the six indicators for reference institutions used in Clustering Step I

Type of institution	P_{HSS}	P_{SCI}	P_{ENG}	P_{LIFE}	P_{MED}	P_{INTER}
Pure HSS	1	0	0	0	0	0
Pure SCI	0	1	0	0	0	0
Pure ENG	0	0	1	0	0	0
Pure LIFE	0	0	0	1	0	0
Pure MED	0	0	0	0	1	0
Comprehensive (Average of 500)	0.0934	0.2931	0.1531	0.2088	0.2088	0.0427

Clustering Step I: Identifying institutions with disciplinary focus

The distances between each institution and every reference institution are calculated and compared. If the distance between an institution and a single disciplinary reference institution is smaller than that between the institution and the reference institution of comprehensive type, the institution is defined as having disciplinary focus on the discipline. Six types of institutions have been classified from Clustering Step I, namely Focus in HSS, Focus in SCI, Focus in ENG, Focus in LIFE, Focus in MED, and Focus in None. The mean values of the six indicators for the six types of institutions are shown in Table 2.

Table 2. Mean values of the six indicators for institutions having disciplinary focus resulted from Clustering Step I

Type of institution	P_{HSS}	P_{SCI}	P_{ENG}	P_{LIFE}	P_{MED}	P_{INTER}
Focus in HSS	0.7536	0.1175	0.0516	0.0258	0.0401	0.0115
Focus in SCI	0.0147	0.7260	0.1520	0.0641	0.0177	0.0254
Focus in ENG	0.0338	0.3201	0.5992	0.0402	0.0061	0.0006
Focus in LIFE	0.0217	0.0983	0.0487	0.6535	0.1588	0.0190
Focus in MED	0.0412	0.0233	0.0125	0.2247	0.6359	0.0624
Focus in none	0.0949	0.2907	0.1551	0.2101	0.2062	0.0430

Simultaneous assignment to two types

Some institutions are at the margin of two clusters. If the difference between two distances is less than 5% of the sum of the two distances, the concerned institution will be assigned to both types of institutions. For example, if the difference between an institution and the reference institution of Pure ENG type and that between the institution and the reference institution of Comprehensive type is less than 5% of their sum, the institution will be assigned to both the type of Focus in ENG and the type of Focus in None. Similar treatment will also be used in Clustering Steps II and III.

Clustering Step II: identifying institutions with disciplinary priority

For institutions with no focus in any disciplinary group, a second clustering process (Clustering Step II) is performed. The values in Table 2 are used as references for Clustering Step II. Eight types of institutions have been identified, namely Priority in HSS, Priority in SCI, Priority in ENG, Priority in LIFE, Priority in MED, Priority in SCI/ENG, Priority in LIFE/MED, and Priority in None. The mean values of the indicators for six types of institutions are shown in Table 3.

Table 3. Mean values of the six indicators for institutions having disciplinary priority resulted from Clustering Step II

Type of institution	P_{HSS}	P_{SCI}	P_{ENG}	P_{LIFE}	P_{MED}	P_{INTER}
Priority in HSS	0.4512	0.1655	0.0686	0.1566	0.1113	0.0467
Priority in SCI	0.0443	0.5274	0.2414	0.1217	0.0393	0.0259
Priority in ENG	0.0379	0.4017	0.4412	0.0758	0.0267	0.0166
Priority in LIFE	0.0855	0.1537	0.0590	0.4837	0.1562	0.0619
Priority in MED	0.0813	0.0658	0.0324	0.2565	0.4838	0.0802
Priority in none	0.1056	0.2876	0.1389	0.2159	0.2097	0.0425

Institutions having priorities in two disciplinary groups

During Clustering Step II, the distances between some institutions and two reference institution types are very close. The institutions could be assigned to two types of institutions, such as Priority in SCI and Priority in ENG. Eventually, the types of institutions having two disciplinary priorities are formed, including Priority in SCI/ENG and Priority in LIFE/MED.

Clustering Step III: identifying institutions with disciplinary orientation

For institutions with no priority in any disciplinary group, a third clustering process (Clustering Step III) is performed. The values in Table 3 are used as reference values for Clustering Step III. Nine types of institutions have been identified from Clustering Step III, namely Orientation in HSS, Orientation in SCI, Orientation in ENG, Orientation in LIFE, Orientation in MED, Orientation in SCI/ENG, Orientation in LIFE/MED, Orientation in HSS/SCI, and Orientation in None (Balanced). The mean values of the six indicators for six types of institutions are shown in Table 4.

Table 4. The mean values of six indicators for institutions having disciplinary orientation resulted from Clustering Step III

Type of Institution	P_{HSS}	P_{SCI}	P_{ENG}	P_{LIFE}	P_{MED}	P_{INTER}
Orientation in HSS	0.3267	0.3049	0.1257	0.1343	0.0742	0.0342
Orientation in SCI	0.1062	0.4229	0.2103	0.1628	0.0672	0.0306
Orientation in ENG	0.0593	0.3734	0.3018	0.1562	0.0830	0.0264
Orientation in LIFE	0.1053	0.2071	0.1103	0.3848	0.1567	0.0358
Orientation in MED	0.1053	0.1611	0.0668	0.2274	0.3804	0.0589
Orientation in none (Balanced)	0.0980	0.2840	0.1360	0.2188	0.2202	0.0431

Results and discussion

Number of different types of institutions

Table 5 shows the number of institutions for the 21 types classified. There are 27 institutions having disciplinary focuses, 11 of which are in MED and 9 of which are in SCI. 128 institutions have disciplinary priorities, the number of institutions having priorities in MED, SCI, and ENG are 43, 30, 25 respectively. The number of institutions having disciplinary orientations is 111. 270 of the 500 (see footnote of Table 5) institutions are balanced with no orientation, priority or focus in any disciplinary group.

Indicators of different types of institutions

Table 5 also shows the minimum and maximum values of the six indicators for the 21 types of institutions classified. The average percentages of articles in all five disciplines for institutions having disciplinary focus are about 60%–70%. The average percentages of articles in all five disciplines for institutions having disciplinary priority are about 40%-50%. Figure 2 shows the sketch map of the relative positions of cluster centers.

Table 5. The minimum and maximum values of the six indicators for 21 types of institutions

	Type	No.	P_{HSS}	P_{SCI}	P_{ENG}	P_{LIFE}	P_{MED}	P_{INTER}
Focus in	HSS	1	**0.75**	0.12	0.05	0.03	0.04	0.01
	SCI	9	0.00-0.04	**0.67-0.86**	0.02-0.23	0.02-0.18	0.00-0.04	0.01-0.06
	ENG	3	0.01-0.06	0.30-0.35	**0.60**	0.03-0.04	0.00-0.02	0.00
	LIFE	3	0.01-0.04	0.08-0.12	0.03-0.06	**0.61-0.69**	0.10-0.25	0.02
	MED	11	0.00-0.10	0.01-0.05	0.01-0.02	0.17-0.30	**0.57-0.70**	0.02-0.09
Priority in	HSS	2	**0.43-0.47**	0.14-0.19	0.07	0.14-0.17	0.08-0.14	0.03-0.07
	SCI	30	0.01-0.33	**0.49-0.63**	0.06-0.31	0.01-0.25	0.01-0.17	0.01-0.06
	ENG	25	0.00-0.16	0.25-0.42	**0.35-0.60**	0.03-0.16	0.00-0.15	0.00-0.04
	LIFE	11	0.01-0.17	0.08-0.26	0.01-0.12	**0.44-0.61**	0.04-0.25	0.01-0.24
	MED	43	0.00-0.27	0.01-0.25	0.01-0.13	0.12-0.36	**0.38-0.60**	0.02-0.16
	SCI/ENG	15	0.00-0.05	**0.41-0.57**	**0.33-0.51**	0.03-0.16	0.01-0.03	0.01-0.03
	LIFE/MED	2	0.06-0.07	0.01-0.04	0.02	**0.41**	**0.32-0.41**	0.10-0.14
Orientation in	HSS	12	**0.28-0.43**	0.17-0.40	0.07-0.26	0.09-0.21	0.04-0.17	0.01-0.05
	SCI	29	0.00-0.26	**0.35-0.51**	0.08-0.28	0.07-0.33	0.02-0.16	0.01-0.07
	ENG	3	0.00-0.06	0.22-0.34	**0.31-0.35**	0.12-0.34	0.03-0.17	0.02-0.06
	LIFE	14	0.04-0.15	0.13-0.33	0.03-0.17	**0.34-0.45**	0.04-0.25	0.01-0.09
	MED	34	0.00-0.24	0.08-0.26	0.03-0.14	0.14-0.31	**0.31-0.45**	0.02-0.10
	HSS/SCI	2	**0.33-0.35**	**0.36-0.49**	0.09-0.20	0.02-0.06	0.02-0.04	0.02-0.03
	SCI/ENG	16	0.00-0.16	**0.28-0.48**	**0.23-0.36**	0.07-0.27	0.02-0.20	0.01-0.07
	LIFE/MED	1	0.09	0.13	0.06	**0.35**	**0.33**	0.04
	Balanced	270	0.00-0.30	0.13-0.47	0.03-0.35	0.08-0.37	0.03-0.40	0.01-0.17
	Total	536	0.00-0.75	0.01-0.86	0.01-0.60	0.01-0.69	0.00-0.70	0.00-0.24

Note: The total number is 536 because 36 institutions are clustered to two types simultaneously.

Distribution of institutions by country

The distribution of different types of institutions for countries is shown in Table 6. The proportions of institutions with balanced disciplinary characteristics are much lower for non-English speaking countries than English-speaking countries. Among the 8 Chinese institutions classified, no institution is classified into the Balanced type, about 38% of them have disciplinary focuses and another 38% of them have disciplinary

priorities, which are much higher than the average percentages of all countries (5% and 24% respectively). Table 7 shows the statistical distribution of unbalanced types of institutions for these countries. Almost all of the institutions having disciplinary preponderance in HSS are from English-speaking countries. Among other reasons, the language bias in the publications could play a key role. It is also found in Table 7 that most of unbalanced institutions in USA and Japan have focuses, priorities or orientations in MED, whereas in China, South Korea, China-Hong Kong, India, Italy and Spain, etc., all of unbalanced institutions have some preponderance in SCI and/or ENG.

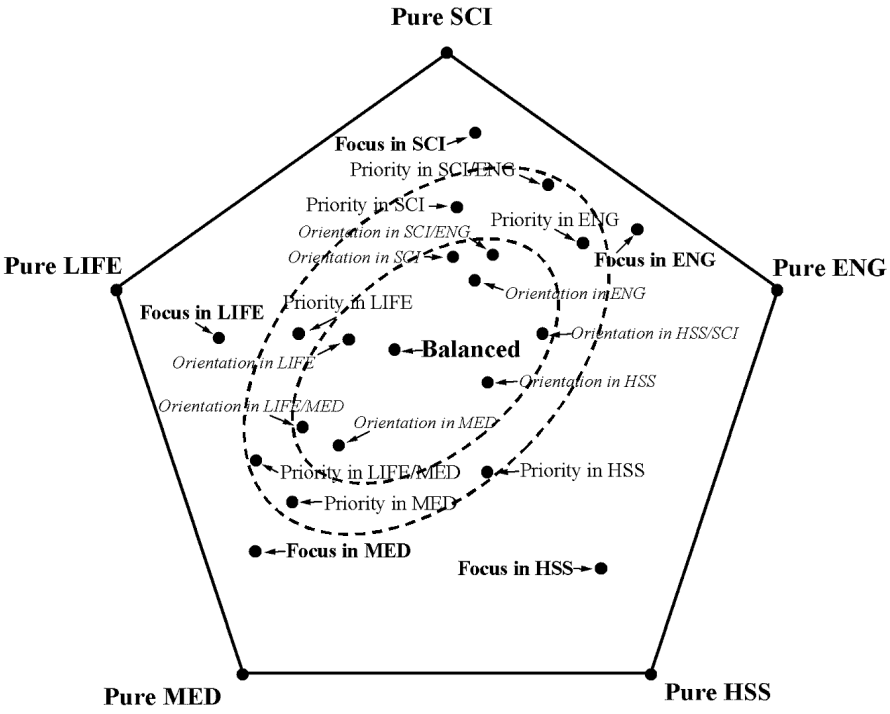

Figure 2. Sketch map of relative positions of cluster centers
Note: Dotted lines separate different types of institutions with focus, priority or orientation.

Table 6. Distribution of different types of institutions by country

Country	Number of institutions	Percentage of balanced institutions	Percentage of institutions with disciplinary		
			Orientation	Priority	Focus
USA	170	41%	26%	29%	4%
Germany	43	63%	14%	19%	5%
UK	41	71%	20%	5%	5%
Japan	36	65%	11%	19%	4%
Canada	23	76%	13%	11%	
Italy	23	78%		17%	4%
France	22	9%	20%	61%	9%
Australia	14	79%	14%	7%	
Netherlands	12	42%	8%	42%	8%
Sweden	10	50%	10%	30%	10%
Spain	9	67%	22%	11%	
China	8		25%	38%	38%
South Korea	8	38%	25%	38%	
Switzerland	8	50%	31%	19%	
Israel	7	71%	14%	14%	
Belgium	6	100%			
Austria	5	30%	30%	20%	20%
China-Hong Kong	5	40%		60%	
Denmark	5	40%	40%	10%	10%
Finland	5	50%	30%	20%	
Brazil	4	100%			
Norway	4	75%	25%		
South Africa	4	75%	25%		
China-Taiwan	3	33%		67%	
Hungary	3	33%		67%	
India	3			100%	
Ireland	3	100%			
New Zealand	3	33%	67%		
Greece	2	50%	50%		
Poland	2		50%	50%	
Russia	2				100%
Singapore	2		50%	25%	25%
Other Countries	5	100%			

Note: If an institution is assigned simultaneously to two types, each type gets 0.5 in this statistics.

Table 7. Percentage distribution of unbalanced institutions by country and disciplinary group

Country	Number of unbalanced institutions	Percentage of institutions with disciplinary focus, priority, or orientation in							
		HSS	HSS/SCI	SCI	SCI/ENG	ENG	LIFE	LIFE/MED	MED
USA	100	8%	2%	16%	6%	7%	13%	2%	47%
France	20			80%		5%	5%		10%
Germany	16			31%	31%	6%	3%		28%
Japan	12.5			16%	32%	4%			48%
UK	12	25%		38%	8%			8%	21%
China	8			63%	13%	25%			
Netherlands	7					43%	14%		43%
Canada	5.5	18%		18%	9%	27%	27%		
Italy	5			40%	40%	20%			
Sweden	5				40%		20%		40%
South Korea	5				60%	40%			
Switzerland	4			50%	25%				25%
Austria	3.5				29%				71%
Australia	3			33%			67%		
Spain	3			100%					
China- Hong Kong	3					100%			
Denmark	3				33%		33%		33%
India	3			33%		67%			
Finland	2.5				40%				60%
Israel	2	50%				50%			
China- Taiwan	2				50%	50%			
Hungary	2			50%	50%				
New Zealand	2						50%		50%
Poland	2			100%					
Russia	2			100%					
Singapore	2					100%			
Other Countries	3						67%		33%

Note: If an institution is assigned simultaneously to two types, each type gets 0.5 in this statistics.

Table 8. Distribution of the top 500 universities by the type of institution and the ranks in the Academic Ranking of World Universities – 2004

		Ranking range of institutions				
Type of institution	No.	Top100	101–200	201–300	301–400	401–500
Balanced	262	58	64.5	56.5	45.5	37.5
Focus in HSS	1			1		
Priority in HSS	1.5					1.5
Orientation in HSS	10		1	2.5	2	4.5
Focus in SCI	9	2		1	3	3
Priority in SCI	28.5	6	2.5	6	7	7
Orientation in SCI	26	6.5	5.5	1.5	6	6.5
Focus in ENG	2				1	1
Priority in ENG	23.5	1	3	6	5.5	8
Orientation in ENG	2.5		1	1		0.5
Focus in LIFE	2.5		1	1	0.5	
Priority in LIFE	10	1	2.5	2	2.5	2
Orientation in LIFE	11.5	0.5	2	0.5	2.5	6
Focus in MED	9.5		1	1.5	1.5	5.5
Priority in MED	37.5	7	10	6.5	6	8
Orientation in MED	28	15	2	6	4.5	0.5
Priority in SCI/ENG	15		3	3	5	4
Orientation in SCI/ENG	15.5	3	1	1	4.5	6
Priority in LIFE/MED	2			1	1	
Orientation in LIFE/MED	1			1		
Orientation in HSS/SCI	1.5				1	0.5
Total	500	100	100	99	99	102

Note: If an institution is assigned simultaneously to two types, each type gets 0.5 in this statistics.

Distribution of institutions by ranking ranges

The distribution of institutions by their type of institution and their ranges in the world university ranking is shown in Table 8. About 61% of the top 200 institutions have balanced disciplinary characteristics whereas only about 41% of the institutions ranked in the range of 301-500 have balanced disciplinary characteristics. On the other hand, only two of the top 100 universities in the world have disciplinary focuses whereas 10% of the institutions ranked in the range of 401-500 have disciplinary focuses.

Concluding remarks

In this study, a tentative method of classifying top 500 world universities by their disciplinary characteristics in five disciplinary groups has been established using scientometrics. Institutions have been classified into types of having focus in a disciplinary group, having priority in a disciplinary group, having orientation in a disciplinary group, and balanced.

However, further studies have to be done. The clustering methodology should be used in combination with other methods. In addition to the percentage of publications, other indicators may also be used, including the percentages of undergraduate students, graduate students, academic staff, and degree programs. Language bias and other technical problems in publication data should also be dealt with.

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Appendix
Disciplinary characteristics of the top 100 universities in the world

World Rank	Country	Institution	HSS	SCI	ENG	LIFE	MED	Balanced
1	USA	Harvard Univ					Priority	
2	USA	Stanford Univ						Balanced
3	UK	Univ Cambridge						Balanced
4	USA	Univ California – Berkeley		Orientation				
5	USA	Massachusetts Inst Tech (MIT)		Orientation	Orientation			
6	USA	California Inst Tech		Focus				
7	USA	Princeton Univ		Priority				
8	UK	Univ Oxford						Balanced
9	USA	Columbia Univ						Balanced
10	USA	Univ Chicago						Balanced
11	USA	Yale Univ						Balanced
12	USA	Cornell Univ						Balanced
13	USA	Univ California – San Diego						Balanced
14	Japan	Tokyo Univ						Balanced
15	USA	Univ Pennsylvania					Orientation	
16	USA	Univ California – Los Angeles						Balanced
17	USA	Univ California – San Francisco					Priority	
18	USA	Univ Wisconsin – Madison						Balanced
19	USA	Univ Michigan – Ann Arbor						Balanced
20	USA	Univ Washington – Seattle						Balanced
21	Japan	Kyoto Univ						Balanced
22	USA	Johns Hopkins Univ					Orientation	
23	UK	Imperial Coll London						Balanced
24	Canada	Univ Toronto						Balanced
25	UK	Univ Coll London					Orientation	Balanced
26	USA	Univ Illinois - Urbana Champaign		Orientation				Balanced
27	Switzerland	Swiss Fed Inst Tech – Zurich		Orientation				
28	USA	Washington Univ – St. Louis					Priority/ Orientation	
29	USA	Rockefeller Univ				Priority		
30	USA	Northwestern Univ						Balanced
31	USA	Duke Univ					Orientation	
32	USA	New York Univ					Orientation	

Appendix (continued)

World Rank	Country	Institution	HSS	SCI	ENG	LIFE	MED	Balanced
33	USA	Univ Minnesota – Twin Cities						Balanced
34	USA	Univ Colorado – Boulder		Orientation				
35	USA	Univ California – Santa Barbara		Priority				
36	Canada	Univ British Columbia						Balanced
37	USA	Univ Texas Southwestern Med Center					Priority	
38	USA	Vanderbilt Univ					Orientation	
39	Netherlands	Univ Utrecht						Balanced
40	USA	Univ Texas – Austin		Orientation				
41	France	Univ Paris 06		Priority				
42	USA	Univ California – Davis				Orientation		Balanced
43	USA	Pennsylvania State Univ – Univ Park						Balanced
44	USA	Rutgers State Univ – New Brunswick						Balanced
45	Germany	Tech Univ Munich						Balanced
46	Sweden	Karolinska Inst Stockholm					Priority	
47	UK	Univ Edinburgh						Balanced
48	France	Univ Paris 11		Priority				
49	USA	Univ Southern California						Balanced
50	USA	Univ Pittsburgh – Pittsburgh					Priority/ Orientation	
51	Germany	Univ Munich					Orientation	Balanced
52	USA	Univ Rochester						Balanced
53	Australia	Australian Natl Univ		Orientation				
54	Japan	Osaka Univ						Balanced
55	USA	Univ California – Irvine						Balanced
56	USA	Univ North Carolina – Chapel Hill					Orientation	
57	Switzerland	Univ Zurich					Priority/ Orientation	
58	USA	Univ Maryland – Coll Park		Orientation				
59	Denmark	Univ Copenhagen					Orientation	
60	UK	Univ Bristol						Balanced
61	Canada	McGill Univ						Balanced
62	USA	Carnegie Mellon Univ			Priority			
63	Netherlands	Univ Leiden					Orientation	
64	Germany	Univ Heidelberg					Priority/ Orientation	

Appendix (continued)

World Rank	Country	Institution	HSS	SCI	ENG	LIFE	MED	Balanced
65	USA	Case Western Reserve Univ					Orientation	
66	Russia	Moscow State Univ		Focus				
67	USA	Univ Florida						Balanced
68	Norway	Univ Oslo						Balanced
69	UK	Univ Sheffield						Balanced
70	Japan	Tohoku Univ		Orientation	Orientation			
71	USA	Purdue Univ – West Lafayette						Balanced
72	Finland	Univ Helsinki					Orientation	
73	USA	Ohio State Univ – Columbus						Balanced
74	Sweden	Uppsala Univ						Balanced
75	USA	Rice Univ		Orientation	Orientation			
76	USA	Univ Arizona						Balanced
77	UK	King's Coll London					Orientation	
78	UK	Univ Manchester						Balanced
79	Germany	Univ Goettingen						Balanced
80	USA	Michigan State Univ						Balanced
81	UK	Univ Nottingham						Balanced
82	USA	Brown Univ						Balanced
83	Australia	Univ Melbourne						Balanced
84	France	Univ Strasbourg 1		Priority				
85	France	Ecole Normale Super Paris		Priority				
86	Austria	Univ Vienna					Orientation	
87	USA	Boston Univ						Balanced
88	Germany	Univ Freiburg						Balanced
89	Canada	McMaster Univ						Balanced
90	Israel	Hebrew Univ Jerusalem						Balanced
91	Switzerland	Univ Basel						Balanced
92	Sweden	Lund Univ						Balanced
93	UK	Univ Birmingham						Balanced
94	Italy	Univ Roma – La Sapienza						Balanced
95	Germany	Humboldt Univ Berlin						Balanced
96	USA	Univ Utah						Balanced
97	Sweden	Stockholm Univ						Balanced
98	Japan	Nagoya Univ						Balanced
99	Germany	Univ Bonn						Balanced
100	USA	Tufts Univ					Priority	