Classification of Universal Higher Education in Taiwan: A Perspective of University Presidents

Ru-Jer Wang and Syuan-Yi Wu

***Abstract*—In recent years, higher education in Taiwan has shifted from elite to universal education. The purpose of this study was to examine how one might classify higher education institutions (HEIs) in a system of universal higher education in Taiwan. A questionnaire was administered to the presidents of colleges and universities in Taiwan. The major findings were as follows: 1) "Typology first and evaluation later" was the most widely-accepted procedure; 2) The most commonly accepted typology was "research university, teaching university, community university, and professional university"; 3) The most suitable procedure was "Universities select the typology, and evaluation is based on the evaluation items of the typology"; and 4) The universities themselves should be given the autonomy to determine the percentage of teaching, research, and service for evaluation.**

***Index Terms*—Classification of higher education, higher education, university president.**

I. Introduction

In recent years, higher education in Taiwan has shifted from elite education to universal education [1]-[3]. In terms of the number of students, the enrollment rates (net enrollment rate) of higher education (age 18-21) increased from 38.70% in 2000 to 68.27% in 2011, an increase of more than 29% (see Table I for details) [4].

TABLE I: Enrollment Rates in Higher Education (among Those Aged 18-21) Unit: %

Year	Total	Male	Female
2000	38.70	35.47	42.11
2001	42.51	38.98	46.23
2002	45.68	42.14	49.41
2003	49.05	45.33	52.99
2004	53.20	49.58	57.04
2005	57.42	54.00	61.06
2006	59.83	56.70	63.16
2007	61.41	58.33	64.71
2008	63.76	60.42	67.37
2009	64.98	61.34	68.93
2010	67.27	63.51	71.37
2011	68.27	64.48	72.38

Sources: Department of Statistics, Ministry of Education of the ROC (2012). *The enrollment rates (of those aged 18-21) in higher education.* Taipei: Ministry of Education.

Notes: 1) General enrollment: Number of tertiary students/number of people at the school, age x 100.

2) From 2004, the general enrollment rate of tertiary education excludes the students of graduate schools and training schools.

With regard to public funding for higher education, $196 thousand per public student was provided in 1995, but only 168 thousand was given in 2005, demonstrating a decline in funding, according to the relevant data by the Bureau of Statistics, Ministry of Education (see Table II for details). On the other hand, public funding for private higher education supplied only $84 thousand in 1994 but $113 thousand in 2007, demonstrating an increase in funding [5].

TABLE II: Public Funding for Higher Education (Unit: NT Dollar)

Year	Public funding per public student (a)	Public funding per private student (b)	Gap of funding (a-b)
1994	186,031	84,384	101,647
1995	196,156	91,231	104,925
1996	190,734	88,335	102,399
1997	196,078	89,035	107,043
1998	184,675	86,105	98,570
1999	193,525	87,805	105,720
2000	176,384	98,163	78,221
2001	182,244	93,902	88,342
2002	173,649	96,241	77,408
2003	177,539	100,455	77,084
2004	170,292	106,924	63,368
2005	168,835	112,097	56,738
2006	171,669	112,771	58,898
2007	179,682	113,747	65,935
2008	181,732	105,076	76,656

Source: Department of Statistics, Ministry of Education of the ROC (2010). *A statistical analysis of educational development in recent 16 years (school year 1994-2009).* Taipei: Ministry of Education.

In order to increase the efficiency of Taiwan's educational system and enhance the quality of its human resources, in 2002 the Executive Yuan's Committee on Visionary Planning for Higher Education proposed the following typology:

1) *Research universities* for cultivating talent through research and the implementation of new knowledge.
2) *Teaching universities* where teaching is the focus, and academic research supports the cultivation of the talent required by different industries.
3) *Professional universities* for cultivating professional skills, with a focus on teaching and providing supervised internships; research is conducted related to professional issues.
4) *Community universities* for meeting the needs of neighboring community residents for higher education and the skill training needed to make a living; recurrent education and continuing education can be included if necessary.

Based on the above points, in order to enhance understanding of how to classify HEIs in universal higher education, this study was carried out with the following aims:

1) To obtain the views of university presidents on how to classify higher education institutions.
2) To apply the research findings to make suggestions for establishing a classification system for higher education in Taiwan.

The scope of this study was limited to general colleges and

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universities and did not include technological and military colleges.

II. Literature Review

Classifying is one of the most challenging tasks that human beings face simultaneously [6]. However, this method also provides a way of bringing order to a disordered situation and can increase the transparency of a complicated system. In the field of higher education, some researchers and other stakeholders have tried to construct an institutional typology which can be used to make a complicated system of higher education easier to understand. They as well as policy makers have used diverse criteria, such as institutional size, location (e.g., urban or rural), mission focus (e.g., teaching and research), and focus of education (e.g., religion education or minority education) to develop typologies for higher education institutions [7].

Classifications of higher education institutions can serve a range of purposes. From a research standpoint, they can offer fresh insights into the structure and function of a nation's higher education system, for example by facilitating the investigation into the flows of inputs and outputs [8]. Moreover, as in [8], [9], classification provides many kinds of strategically relevant information and helps many stakeholders, including students, academics, business and industry parties, policymakers, and certainly also the higher education institutions themselves to make realistic and well-informed choices.

Institutional typology is important in understanding the similarities and differences among colleges and universities [10]. Unfortunately, it is difficult to design a satisfactory taxonomy; in other words, we can't determine the best college or best university but can ascertain high-performing research universities, highly selective private colleges, academically distinguished undergraduate institutions, and individually productive faculty members [11]. So far, two significantly different typologies are evident. The first is the system-level typology. Usually sponsored by the government, this is based on typologies defined in legal terms, the most well-known example being the binary system used in many European countries. The second is an institutional typology based on similarities and differences, the most well-known example being the Carnegie Classification in the United States [12], [13].

The binary system in many European countries: Some researchers have attempted to classify higher education systems in their research literature [14]-[16]. Reference [17], [18] both divide the higher education system into five categories: 1) university-dominated systems, 2) dual systems, 3) binary systems, 4) unified systems, and 5) stratified systems. The binary system for higher education was first established in the UK and Australia in the mid-1960s, and it can be deemed a more formalized version of a dual system [17]. Also, the dual system enables universities and other post-secondary education institutions to be regarded as entirely separate and treated differently in higher education. By contrast, the binary system causes higher education to be divided into two categories: 1) traditional universities and 2) multidisciplinary and multipurpose colleges. Furthermore, Kyvik pointed out that binary higher education systems are present today in the Netherlands, Belgium, Germany, Sweden, Norway, Ireland, Greece, Portugal, Denmark, and Finland. Nevertheless, the classification can contribute to the process of internal quality development, but empirical knowledge about and transparency of the institutional diversity of European higher education is still rather limited [19].

The Carnegie Classification in the United States: Since the system-level typology has historically been more prevalent in Europe, the Carnegie Classification was in widespread used in the United States. It was designed to represent and control for higher education institutional differences by the Carnegie Foundation for the Advancement of Teaching (CFAT), was originally published in 1973, and divided higher education institutions into five categories: 1) doctoral-granting institutions, 2) comprehensive colleges, 3) liberal arts colleges, 4) all two-year colleges and institutes, and 5) professional schools and other specialized institutions. Yet, the Carnegie Classification was not static, but was subsequently updated in 1976, 1987, 1994, 2000, 2005, and 2010 to reflect changes among colleges and universities. It has been the cardinal framework for recognizing and describing institutional diversity during the past four decades. In order to allow different dimensions of the United States system of universities and colleges to be addressed, instead of one single classification, the new Carnegie Classification used a set of multiple, parallel classifications [12]. At present, the 2010 classification framework includes six parallel classifications: 1) the undergraduate instructional program, 2) the graduate instructional program, 3) the enrollment profile, 4) the undergraduate profile, 5) size and setting, and 6) basic classification (the traditional Carnegie Classification framework) [20].

Researchers used the Carnegie Classification as a main variable in studying issues such as tuition [21], teachers' teaching and research [21]-[24], and teachers' salaries [25], [26]. Another study classified 47 Korean universities with doctoral programs into 7 research universities, 14 research active universities, and 26 doctoral universities according to institutional research performance [7]. He argued that a performance-based approach was shown to be equivalent to that of conventional classifications using predetermined benchmarks. Reference [24] point out that the classification criteria of national research universities include five dimensions: 1) research funding, 2) a variety of instructional programs, 3) the level of instructional programs, 4) instructors and research staff members, and 5) the student body.

In addition, as an illustration in a study of institutional typology, the related study point out that other researchers also try to construct an institutional typology [27]; for instance, as in [28] classify higher education institutions into four groups: 1) major league, 2) minor league, 3) bush league, and 4) academic Siberia. Another study classify higher education institutions into two groups: 1) four-year colleges and universities and 2) two-year colleges [29]. Reference [30] divides higher education institutions into five domains: 1) four-year 1 through 6, 2) two-year with bachelor's, 3) two-year 1 through 3, 4) technical institute or college 1 and 2,

and 5) technical institute or college-size unknown (specialized). Reference [31] classifies higher education institutions into five groups: 1) doctoral, 2) master's, 3) baccalaureate, 4) two-year institutions with academic ranks, and 5) two-year institutions without academic ranks.

Classification of higher education institutions in Taiwan: Regarding related studies conducted in Taiwan, as in [32] designed two research tools, titled "Questionnaire on the three Functions of Colleges and Universities in Taiwan" and "Questionnaire on the overall performance of Colleges and Universities in Taiwan." Lee invited scholars of higher education, supervisors in the Department of Higher Education, and university presidents to evaluate the importance of measuring performance on the three main functions of colleges and universities: 1) teaching, 2) research, and 3) services. Based on the results, Lee classified the 54 colleges and universities in Taiwan into the categories of prominent performance, balanced development, underdeveloped, and in need of improvement. The prominent performance and balanced development categories mostly consisted of public schools with a long history. Another related study using higher education evaluation in the UK as an example [33]. The study treated the domestic and foreign university typologies mentioned above as the analytical basis for developing a typology-based evaluation suitable for Taiwan. In addition, a recent study has used three indexes: 1) the research university index, 2) the teaching university index, and 3) the internationalization university index, and Kuo tried to prove that domestic higher education is that which is in place in Europe and the United States, and it can be classified into research and teaching developed trends [34]. Kuo summarized that 81 universities can be divided into nine groups and found that the result of this study is the same as the results regarding the subsidies of Aim for Top University Plan by Taiwan's Ministry of Education.

By and large, since higher education in Taiwan has shifted from elite education to universal education, institutions of higher education should develop their own functions and features to help meet internal and external demand. Therefore, it is clear that institutional typology has become a crucial issue in research on education. However, most of these studies are based on the subjective views of institutional typology, rather than on empirical evidence of classification of universities. Therefore, based on the literature surveyed above, in this research we focus on the classification system of universal higher education.

III. Research Design and Method

A questionnaire was sent to the presidents of all of the colleges and universities in Taiwan in order to determine their views on a classification system of universities. The research questions were as follows:

- What are the views of university presidents about a classification system for universities?
- Do the background variables of university presidents influence their views on a classification system for universities?

The questionnaire design was based on the previous research presented above, and revisions were made according to the suggestions of ten experts. A total of 71 questionnaires were distributed and 49 were returned, providing a return rate of 69%.

IV. Results, Discussion and Analysis

A total of 47 valid questionnaires were returned. As shown in Table III, among the 47 university presidents, 42 were male and 5 were female; 25 were at public universities and 22 were at private universities. In terms of the type of school, 42 were at universities, and 4 were at independent colleges; regarding the location of the schools, 21 were in northern Taiwan, 12 were in the center, 12 were in the south, and 2 were in the east.

TABLE III: Background Variables of the Participants

	Background variable	Frequency	Percentage
Gender	Male	42	89.4
	Female	5	1.6
	Total	47	1.0
Public/ private	Public	25	53.2
	Private	22	46.8
	Total	47	1.0
Type of school	University	42	91.3
	College	4	8.7
	Total	46	1.0
Area of school	Northern Taiwan	21	44.7
	Central Taiwan	12	25.5
	Southern Taiwan	12	25.5
	Eastern Taiwan	2	4.3
	Total	47	1.0

TABLE IV: Participants' Responses to Question 1

Which of the following procedures of typology-based evaluation is most suitable for colleges and universities in Taiwan?

	Frequency	Percentage	Chi-square value
Evaluation first and typology later	3	6.4	χ^2 = 43.809***
Typology first and evaluation later	31	66.0	
Typology is unrelated to evaluation	9	19.1	
No typology	4	8.5	
Total	47	1.0	

*** $p < .001$

TABLE V: Participants' Responses to Question 2

What categories should be included in a typology of colleges and universities in Taiwan?

	Frequency	Percentage	Chi-square value
Research university	39	17.6	χ^2 = 14.385
Teaching university	38	17.1	
Professional university	33	14.9	
Community university	34	15.3	
Research-teaching university	21	9.5	
Teaching-research university	20	9.0	
Doctoral university	3	1.4	
Master's university	0	.0	
Bachelor's university	0	.0	
Service university	7	3.2	
Comprehensive university	17	7.7	
Single-subject university	6	2.7	
Others	4	1.8	
Total	222	1.0	

*** $p < .001$

As shown in Table IV, for Question 1 the chi-square value was 43.809, which shows that the views were significantly different. A total of 31 principals selected "typology first and evaluation later" (66.0%), 9 selected "typology is unrelated to evaluation" (19.1%), 4 selected "no typology" (8.5%), and 3 selected "evaluation first and typology later" (6.4%).

As shown in Table V, for Question 2 the chi-square value was 14.385, which shows that the views were not significantly different. "Research University" was selected by 39 of the respondents (17.6% of all responses); "teaching university" was selected 38 times (17.1%); "Community University" was selected 34 times (15.3%); and "professional university" was selected 33 times (14.9%).

TABLE VI: PARTICIPANTS' VIEWS ON QUESTION 3

What is the most suitable typology for colleges and universities in Taiwan?	Frequency	Percentage	Chi-square value
Research university, teaching university, professional university, and community university	39	17.6	
Research university, research-teaching university, and teaching-research university	38	17.1	
Doctoral university, master's university, and bachelor's university	33	14.9	χ^2 = 41.267***
Teaching university, research university, and service university	34	15.3	
Comprehensive university and single-subject university	21	9.5	
Others	4	1.8	
Total	222	1.0	

*** $p < .001$

TABLE VII: PARTICIPANTS' VIEWS ON QUESTION 4

What is the most suitable typology-based evaluation procedure for colleges and universities in Taiwan?	Frequency	Percentage	Chi-square value
Universities select the typologies, and evaluation is based on the evaluation items of the typologies.	27	60.0	
University typology is based on objective data, and evaluation is based on the evaluation items of the typology.	6	13.3	χ^2= 15.600***
Typology measures are first constructed, and universities select or evaluate unit typologies.	12	26.7	
Total	45	1.0	

*** $p < .001$

As shown in Table VI, for Question 3 the chi-square value was 41.267, which shows that there was a significant difference in views. "Research university, teaching university, professional university, and community university" was selected a total of 39 times (17.6% of all responses); "research university, research-teaching university, and teaching-research university" was selected 38 times (17.1%); and "teaching university, research university, and service university" was selected 34 times (15.3%).

As shown in Table VII, for Question 4 the chi-square value was 15.600, which shows that the views were significantly different. A total of 27 participants (60.0%) chose "universities select the typologies and evaluation is based on the evaluation items of the typologies"; 12 participants (26.7%) chose "typology measures are first constructed, and universities select or evaluate unit typologies"; and only six participants (13.3%) chose "university typology is based on objective data, and evaluation is based on the evaluation items of the typology".

As shown in Table VIII, for Question 5 the chi-square value was 33.800, which shows that the views were significantly different. A total of 42 participants (93.3%) agreed, and only three participants disagreed (6.7%).

TABLE VIII: PARTICIPANTS' VIEWS ON QUESTION 5

Regarding the items of typology-based evaluation, do you agree that the universities themselves can determine the percentage of teaching, research, and service for evaluation?	Frequency	Percentage	Chi-square value
Agree	42	93.3	
Disagree	3	6.7	χ^2 = 33.800***
Total	45	1.0	

*** $p < .001$

As shown in Table IX, for Question 6 the chi-square value was 37.400, which shows that the views were significantly different. A total of 22 participants (48.9%) agreed, and only 21 participants disagreed (46.7%)

TABLE IX: PARTICIPANTS' VIEWS ON QUESTION 6

Do you agree that universities can be divided into teaching universities, research universities, and service universities according to the emphasis they give to each purpose?	Frequency	Percentage	Chi-square value
Agree	22	48.9	
Disagree	21	46.7	χ^2= 37.400***
Total	45	1.0	

*** $p < .001$

V. INFLUENCE OF PARTICIPANT'S BACKGROUND

Regarding the chi-square test of the influence of background on the participants' responses, the only question for which a significant difference was found was "Do you agree that universities can be divided into teaching universities, research universities, and service universities according to the emphasis they give to each purpose?" (See Table X for details).

VI. CONCLUDING REMARKS

First, the benefits of such a classification system are as follows: 1) the system can serve as a reference for university typology and positioning; 2) the system can serve as a reference for rewarding universities; 3) the results can be used by universities of the same typology to construct cooperation mechanisms between different schools and fields.

Second, classification can have valid policy applications. In this study, we have found that research university, teaching university, community university, and professional

university are the most widely accepted typologies, and the most widely accepted procedure is to have the universities select the typologies and perform the evaluation based on the evaluation items. However, we should proceed with caution in this classification. Reference [19] argues that the incorporation of this classification into formal policy in a way that advantages certain categories and disadvantages others (or indeed, any use that has such an effect) risks inducing strategic responses that can undermine the classification's purpose as a neutral and objective tool.

TABLE X: INFLUENCE OF PARTICIPANT'S BACKGROUND

Questions	Gender		Public/private		Type of school		Location	
	Chi-square value	Significance	Chi-square value	Significance	Chi-square value	Significance	Chi-square value	Significance
1. Which typology-based evaluation of colleges and universities in Taiwan would you prefer?	1.257	.739	3.968	.265	2.120	.548	6.772	.661
2. What is the most suitable typology for colleges and universities in Taiwan?								
Research university	.689	.708	4.124	.127	.809	.667	5.246	.513
Teaching university	.027	.871	1.108	.293	.157	.692	2.557	.465
Professional university	.381	.537	.490	.484	1.784	.182	7.699	.053
Community university	.108	.743	2.890	.089	.006	.937	3.224	.358
Research-teaching university	.465	.495	.122	.727	.020	.889	2.323	.508
Teaching-research university	.028	.868	.006	.938	.055	.815	1.564	.667
Doctoral university	.391	.532	.196	.658	.314	.575	1.406	.704
Master's university	-	-	-	-	-	-	-	-
Bachelor's university	-	-	-	-	-	-	-	-
Service university	1.007	.316	.971	.324	.298	.585	2.875	.411
Comprehensive university	.692	.405	.218	.641	.305	.581	.715	.870
Single subject university	.841	.359	1.228	.268	.517	.472	4.226	.238
Others	.903	.342	1.521	217	1.407	.236	2.598	.458
3. Which is the most suitable typology for colleges and universities in Taiwan?	3.132	.680	6.790	.237	2.130	.831	14.289	.504
4. What is your opinion regarding the typology-based evaluation of colleges and universities in Taiwan?	3.469	.177	3.487	.175	2.770	.250	7.360	.289
5. Regarding the items of typology-based evaluation, do you agree that the universities themselves can determine the percentage of teaching, research, and service for evaluation?	.402	.526	.230	.632	.322	.570	.473	.925
6. Do you agree that universities can be divided into teaching universities, research universities, and service universities according to the emphasis they give to each purpose?	8.269	.041*	2.239	.524	12.886	.005**	26.241	.002**

* $p < .05$; ** $p < .01$

Third, this study found that "universities select the typologies, and the evaluation is based on the evaluation items" was the most widely accepted procedure; next came "Typology measures are first constructed, and universities select or evaluate unit typologies"; last was "university typology is based on objective data, and evaluation is based on the evaluation items."

Finally, universities should first select "Research University, teaching university, Community University, and professional university" and then determine the percentage of teaching, research, and services according to the typology. According to the findings, in a future implementation of a classification of colleges and universities, "typology first and evaluation later" should be adopted. Universities should first select a typology and then determine the percentage of teaching, research, and services in order to position themselves effectively and develop the required strengths.

APPENDIX: THE QUESTIONNAIRE

A. Basic Information (Please Check One Item)

1) Gender:
   (A) Male
   B) Female
2) Public/private school:
   (A) Public
   (B) Private
3) Type of school:
   (A) University
   (B) College
4) Location of the school:
   (A) North (Keelung City, Taipei City, Taipei County, Taoyuan County, Hsinchu County, Hsinchu City, Miaoli County)
   (B) Central (Taichung County, Taichung City, Nantou County, Changhua County)
   (C) South (Yunlin County, Chiayi County, Chiayi City, Tainan County, Tainan City, Kaohsiung City, Kaohsiung County, Pingtung County)
   (D) East (Yilan County, Hualien County, Taitung County)

B. Questions Related to Typology-Based Evaluation of Universities in Taiwan (Please Check One Item)

1) Which of the following procedures of typology-based evaluation is most suitable for colleges and universities in Taiwan?
   (A) Evaluation first and typology later
   (B) Typology first and evaluation later
   (C) Typology is unrelated to evaluation
   (D) No typology
2) What categories should be included in a typology of colleges and universities in Taiwan? (Select more than one)
   (A) Research university
   (B) Teaching university
   (C) Professional university
   (D) Community university
   (E) Research-teaching university
   (F) Teaching-research university
   (G) Doctoral university
   (H) Master's university
   (I) Bachelor university
   (J) Service university
   (K) Comprehensive university
   (L) Single-subject university
   (M) Other (please specify)

C. What Is the Most Suitable Typology for Colleges and Universities in Taiwan? (Select All That Apply)

(A) Research university, teaching university, professional university, and community university
(B) Research university, research-teaching university, and teaching-research university
(C) Doctoral university, master's university, and bachelor's university
(D) Teaching university, research university, and service university
(F) Comprehensive university and single-subject university
(G) Other (please specify): _____

D. What Is the Most Suitable Typology-Based Evaluation Procedure for Colleges and Universities in Taiwan?

(A) Universities select the typology, and evaluation is based on the evaluation items of the typology.
(B) University typology is based on objective data, and evaluation is based on the evaluation items of the typology.
(C) Typology measures are first constructed, and then universities select or evaluate unit typology

E. Regarding the Key Items of Typology-Based Evaluation, Do You Agree That the Universities Themselves Can Determine the Percentage of Teaching, Research, and Service for Evaluation?

(A) Agree
(B) Disagree
Why?: _____

F. Do You Agree That Universities Can Be Divided into Teaching Universities, Research Universities, and Service Universities According to the Emphasis They Give to Each Purpose?

(A) Agree
(B) Disagree
Why? _____

REFERENCES

[1] M. Trow, "From mass to universal access," *Research and Occasional Paper Series Research*, 2000.
[2] M. Trow, "Reflections on the transition from elite to mass to universal access: Forms and phases of higher education in modern societies since WWII," in P. Altbach ed., *International Handbook of Higher Education*, Kluwer, 2005.
[3] M. Trow, *Twentieth-Century Higher Education: Elite to Mass to Universal*, Baltimore: The John Hopkins University Press, 2010.
[4] Department of Statistics, Ministry of Education of the ROC, *The Enrolment Rates (Aged 18-21) in Higher Education*, Taipei: Ministry of Education, 2012.
[5] Department of Statistics, Ministry of Education of the ROC, *A Statistical Analysis of Educational Development in Recent 16 Years (School Years of 1994-2009*), Taipei: Ministry of Education, 2010.
[6] L. S. Shulman, *The Carnegie Classification of Institutions of Higher Education*, CA: The Carnegie Foundation for the Advancement of Teaching, 2000.
[7] J. C. Shin, "Classifying higher education institutions in Korea: A performance-based approach," *Higher Education*, vol. 57, pp. 247-266, 2009.
[8] A. C. McCormick, "Classifying higher education institutions: Lessons from the carnegie classification," *Pensamiento Educativo*, Revista de Investigación Educacional Latinoamericana, vol. 50, no. 1, pp. 65-75, 2013.
[9] S. Reichert, "Using the classification in the European higher education area," *Higher Education Dynamics*, vol. 28, pp. 105-122, 2009.
[10] J. Luan, C. M. Zhao, and J. C. Hayek, "Using a data mining approach to develop a student engagement-based institutional typology," *IR Applications*, vol. 18, pp. 1-19, 2009.
[11] J. V. Lombardi. (2000). How classifications can help colleges. [Online]. Available: http://chronicle.com/article/How-Classifications-Can-Help/35958
[12] J. Bartelse and F. V. Vught, "The European higher education classification: Objectives and concepts," *Higher Education Dynamics*, vol. 28, pp. 57-69, 2009.
[13] ESIB. (2005). The Development of a Typology of HEIs in Europe. [Online]. Available: http://www.esu-online.org/news/article/6065/124/
[14] D. Furth, *Short-Cycle Higher Education: A Search for Identity*, Paris: OECD, 1973.
[15] M. Kogan, "Diversification in higher education: Differences and commonalities," *Minerva*, vol. 35, pp. 47-62, 1997.
[16] U. Teichler, *Changing Patterns of the Higher Education System: The Experience of Three Decades*, London: Jessica Kingsley Publishers, 1988.
[17] S. Kyvik, "Structural changes in higher education systems in Western Europe," *Higher Education in Europe*, vol. 29, no. 3, pp. 393-409, 2004.
[18] P. Scott. (1995). Unified and binary systems of higher education in Europe. [Online]. Available: http://digilib.bc.edu/reserves/ed779/altb/ed77945.pdf
[19] C. Gaehtgens and R. Peter, "Using the classification in the European research area," *Higher Education Dynamics*, vol. 28, pp. 123-137, 2009.
[20] The Carnegie Foundation for the Advancement of Teaching. (2010). The Carnegie Classification of institutions of higher education™. [Online]. Available: http://classifications.carnegiefoundation.org/
[21] J. Shin and S. Milton, "Rethinking tuition effects on enrollment in public four-year colleges and universities," *Review of Higher Education*, vol. 29, no. 2, pp. 213-237, 2006.
[22] C. E. Glassick, M. T. Huber and G. I. Maeroff, *Scholarship Assessed: Evaluation of the Professoriate*, San Fransisco: Jassey-Bass, 1997.
[23] B. B. Henderson and H. E. Buchanan, "The scholarship of teaching and learning: A special niche for faculty at comprehensive universities?" *Research in Higher Education*, vol. 48, no. 5, pp. 523-543, 2007.
[24] K. Phusavat, S. Ketsarapong, J. Ranjan, and B. Lin, "Developing a university classification model from performance indicators," *Performance Measurement and Metrics*, vol. 12, no. 3, pp. 183-213, 2011.
[25] K. Burke, K. Duncan, L. Krall, and D. Spencer, "Gender differences in faculty pay and faculty salary compression," *The Social Science Journal*, vol. 42, pp. 165-181, 2005.
[26] P. F. Hanley and D. J. Forkenbrock, "Making fair and predictable salary adjustments for faculty of public research universities," *Research in Higher Education*, vol. 47, no. 1, pp. 111-127, 2006.

[27] A. C. McCormick and C. Zhao, "Rethinking and reframing the Carnegie classification change," vol. 37, pp. 50- 57, 2005.
[28] T. Caplow and R. McGee, *The Academic Marketplace*, New York: Basic Books, 1958.
[29] R. Zemsky, S. Shaman, and D. B. Shapiro, "Segments," *New Directions for Institutional Research*, vol. 111, pp. 21-37, 2001.
[30] SREB. (2014). Criteria and definitions. [Online]. Available: http://www.sreb.org/page/1135/criteria_and_definitions.html
[31] AAUP. (2014). 2013-2014 Explanation of Statistical Data. [Online]. Available: http://www.aaup.org/2013-14-explanation-statistical-data
[32] C.-H. Lee, "A Study on the development of classification model for general colleges and universities in Taiwan," Master's thesis, Graduate Institute of Education, National Sun Yai-sen University, 2002.
[33] C.-Y. Yu, "University classification and evaluation of higher education - A case study of UK," Master's thesis, Graduate Institute of Education, National Chiao Tung University, 2005.
[34] Y.-C. Kuo, "A study of university classification by the similarity analysis," Master's thesis, Department of Business Administration, Chung Yuan Christian University, 2010.

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