

# Measurement of Occupation Gender Segregation of Women Teachers in Chinese Regular Institutions of Higher Learning --Based on the 2007-2016 National Education Statistical Panel Data

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**Abstract:** Women teachers have been increasingly growing to be an important part in human resources in universities and colleges, as the higher education develops rapidly. Based on the statistical data of the Ministry of Education, the paper employed size-standardized index of dissimilarity (Ds) to measure the professional titles, being as tutors of master's degree candidates and other academic development segregation and changes of full-time women teachers respectively in national regular institutions of higher learning within ten years from 2007 to 2016, and analyzed the occupation gender segregation of women teachers in Chinese regular institutions of higher learning from the macro perspective. The results indicate that the occupation gender segregation of women teachers is not significant, but the vertical segregation is significant; the gender segregation degree of being tutors of master's degree candidates is larger than the professional title segregation; the gender segregation index of being tutors of master's degree candidates varies relatively slightly, while the professional title segregation index varies relatively greatly. These results show that the academic and career development space of campus women teachers is not expanded and optimized when the number of women teachers is growing.

## 1. Introduction

### 1.1 Research Background

The employment policies of China have highlighted on the employment scale and rate of all the people, and paid relatively less attention to the employment quality and gender equality development, and social gender consciousness mainstreams are absent in policy making and implementation. In 2016, the quantities of institutions of higher learning and full-time teachers were 2,596 and 1,601,968 respectively, and women teachers accounted for 49.22%. As the number of campus women teachers is growing dramatically, was the academic career of women teachers improved significantly? Did occupation gender segregation exist in regular institutions of higher learning? They are gender equality development matters worth examining and reflecting.

### 1.2 Literature Rearview

#### 1.2.1 Research Trends of Foreign Scholars

The women career development equality research has sociology, management and demography perspectives, and it provokes discussions about gender essential attributes theory, social role theories and female marginalization theory. The labor market in the academic industry has its special features, and the occupational segregation and fair employment get the attention of scholars (Abramson&Joan,1975; Carter &Susan.B,1983). Gender structure, women administrators, governmental fund support and geographical factors affected the gender segregation in universities and colleges. Compared with cultural and economic factors, the organization and employment ways and organizational mechanism exerted more influence on the glass ceiling effects of female academic. Education is not only a field with quite many women, but also an area with vertical and horizontal segregation (Susanne Kreitz-Sandberg, 2013).

### 1.2.2 Research Trends of Domestic Scholars

Domestic scholars of doing research on different occupation gender segregation in nationwide labor market are represented by Wu Yuxiao (2008), Li Chunling (2009) and Li Wangyang (2016), etc. The representative achievements about occupational segregation of campus students include measurement of regional universities/colleges (Su Minghui, 2007) or gender segregation of women teachers in different disciplines, schools and professional titles in a specific university (Lu Genshu, 2010), the analysis of career barriers under the background of age, marriage, education background, professional title and specialties of campus women teachers (Cheng Fang, 2011). In addition, some scholars analyzed the academic occupation gender segregation in China and the income difference relation with teachers based on micro data (Shen Hong and Xiong Junfeng, 2014; Xu Peng and Zhou Changcheng, 2015).

To sum up, There are less than enough literature results from the measurement of occupation gender segregation indexes of Chinese campus women teachers, which adopts the quantitative way with nationwide institutions of higher learning as the research scope and the macro panel data as the basis, and the achievements are urgently needed to be supplemented.

## 2. The Concept and Measurement Indexes of Occupation Gender Segregation

### 2.1 Meaning of Occupation gender segregation

In foreign academic world, the occupation gender segregation has become an important index to measure laborforce gender inequality (Goldin, 1990; Reskin, 1993; Charles, Grusky, 2004; Marini, 1989; England, 1992). The concept of occupation gender segregation was raised by Edward Gross (1968) at the earliest, and he pointed out that on the labor market, labors are allocated to different professions due to gender difference and they are engaged in different jobs. Anker (1997) divides the occupation segregation into the horizontal and vertical segregation. The former refers to the distribution of males and females in different professions, and the later refers to one gender in the relatively advanced grade or level in the same profession.

### 2.2 Measurement Indexes of Occupation Gender Segregation

The choice of measurement indexes of occupation gender segregation has been the concern of the academic world, and it has undergone different development courses. At present, the summary index is the most frequently used, the main measurement indexes include Duncan index, size-standardized index of dissimilarity, Karmel-Maclachian index, associated index and square root index, and the five measurement indexes have their pros and cons, principles and applicable scopes. Since the number of campus students accounts for a relatively small proportion among the whole employments in China, in order to avoid the occupation scale's sensibility influence on segregation indexes and give consideration to the time series comparison of campus women teachers' gender segregation indexes, the author chooses the size-standardized index of dissimilarity (Ds) to measure the occupation gender segregation extent of women teachers in institutions of higher learning.

### 2.3 Meaning and Calculation of Size-Standardized Index of Dissimilarity (Ds index)

The size-standardized index of dissimilarity is evolved from Duncan index. The so-called Duncan index is also known as index of dissimilarity, which is abbreviated as D index. D index was raised by Duncan in 1955, it was used for research on segregation of residents of ethnic groups, and later it has been applied to measure different profession gender segregations extensively. As D index does not give considerations to the difference of multi-year profession samples in terms of profession scale and labor market's gender structure, Gibbs (1965) and Gross (1968) and other scholars proposed to amend D index, and then put forward the size-standardized index of dissimilarity (Ds index for short), and the calculation formula is shown in (1-1).

$$D_s = \frac{1}{2} \sum_{i=1}^n \left| \left[ \frac{(W_i/T_i)}{\sum_{i=1}^n (W_i/T_i)} \right] - \left[ \frac{(M_i/T_i)}{\sum_{i=1}^n (M_i/T_i)} \right] \right| \times 100 \quad \text{Formula (1-1)}$$

Wherein, Ds indicates size-standardized index of dissimilarity, and Ti is the total quantity of the

profession  $i$ ;  $T_i = M_i + W_i$ .  $W_i$  is the women labor force quantity of the  $i^{\text{th}}$  profession,  $W$  is the total of women labor force,  $M_i$  is the total of male labor force of the  $i^{\text{th}}$  profession,  $M$  is the total of male labor force, and  $j$  indicates the total of the professions. The value range of  $D_s$  is 0~100. When  $D_s=0$ , it means in this profession, the female and male have the same employment proportion, i.e. the profession gender segregation does not exist; when  $D_s=100$ , it means the absolute profession gender segregation exists in the profession.

### **3. Measurement of Profession Gender Horizontal and Vertical Segregation Extent of Teachers in Nationwide Regular Institutions of Higher Learning**

#### **3.1 Data Source**

According to the statistical data of the Ministry of Education of China, the thesis took the regular institutions of higher learning as the research scope<sup>1</sup> and the full-time teachers as research objects<sup>2</sup>, compared and analyzed the quantity, profession title and being tutors of master's degree candidates of full-time women teachers within 10 years from 2007 to 2016, and analyzed the occupation gender segregation of Chinese campus teachers in the macro perspective.

#### **3.2 Measurement of Occupation Gender Horizontal Segregation of Full-Time Women Teachers in Nationwide Regular Institutions of Higher Learning**

According to the judgment viewpoint of Anker (1997) about the horizontal segregation, the quantity of full-time women teachers in nationwide regular institutions of higher learning released by the Planning Department of the Ministry of Education increased to 788,558 in 2016 from 26,279 in 2007, and the proportion went up to 49.22% from 45.05%. The quantity of campus full-time women teachers is on the rise alongside the total of campus teachers, and the mean proportion of full-time women teachers within the 10 years was 47.10%, close to 50%. This indicates that women teachers have increasingly become the main part in human resources of universities and colleges, and they play an increasingly important role in higher education. The female and male teachers have the basically balanced employment proportions in regular institutions of higher learning, if it is only judged from the quantity structure, and the occupation gender segregation of women teachers in nationwide regular institutions of higher learning is not significant.

#### **3.3 Vertical Occupation Gender Segregation Measurement of Women Teachers in Nationwide Regular Institutions of Higher Learning Based on $D_s$ Index**

Academic career ladder is the visual representation of campus teachers' academic value, and the evaluation indexes of occupational development of campus teachers have multiple dimensions (Wu Yanyun, 2013). However, considering the availability of the macro data, the author chose two core indexes, the professional title and being tutors of master's degree candidates, to reflect the academic promotion of campus teachers.

##### **3.3.1 Professional Title of Gender Segregation Measurement**

From 2007 to 2016, the proportions of women teachers in universities and colleges having senior, middle and junior titles are on the rise every year. However, the proportion of senior women teachers is less than 1/3 of total teachers with the same professional title, and the proportion of deputy senior women teachers is less than 1/2 of the teachers having the same professional title.

Calculate  $D_s$  index according to formula (1-1).  $n=5$ ,  $i=1, 2, 3, 4$  and  $5$  mean the senior, deputy senior, middle, junior and no professional titles of women teachers in universities and colleges respectively,  $W_i / T_i$  indicate the proportions of full-time women teachers having the  $i^{\text{th}}$  professional

<sup>1</sup> The relevant data of regular institutions of higher learning released by the Ministry of Education includes universities, higher vocational schools, technical colleges and other regular institutions of higher learning.

<sup>2</sup> The relevant data of full-time teachers released by the Ministry of Education particularly refers to full-time teachers of university headquarters, excluding administrative staffs, teaching assistants, workers, scientific research personnel, employees of university-run enterprises and personnel of other affiliated institutions.

titles among national teachers with the same professional title, and  $M_i / T_i$  indicate the proportions of full-time men teachers having the  $i^{\text{th}}$  professional titles among national teachers with the same professional title. It is calculated that the occupation segregation Ds index of women teachers in national regular institutions of higher learning in 2007~2016 is denoted by Ds1 for distinguishing, as shown in Table. In recent ten years, the occupation gender segregation Ds index of women teachers in national regular institutions of higher learning is on the decline on the whole. Ds1 index dropped from 2007 to 2012, increased from 2012 and 2014, and then fell from 2014 to 2016. The mean value of Ds1 index in recent ten years is 17.33, and Ds1 were all larger than 0. As a whole, the proportions of women teachers with higher professional and technical titles are on the decline obviously. Compared with men teachers, the academic career of women teachers has the significant “occupation gender barriers” phenomenon<sup>[17]</sup>.

### 3.3.2 Measurement of Gender Segregation of Being Tutors of Master’s Degree Candidates

It is the demonstration of the teaching responsibility of campus teachers to be tutors of master’s degree candidates concurrently, and also their academic career development and promotion. Based on the data of women teachers in nationwide regular institutions of higher learning as tutors of PhD or master’s degree candidates within 10 years, the thesis further analyzed their occupation and gender development difference.

Apply the formula (1-1) to calculate the gender segregation Ds2 index, of which  $n=3$ ,  $i=1, 2$  and 3 indicate the campus women teachers as tutors of PhD’s degree candidates, master’s degree candidates and PhD and master’s degree candidates concurrently,  $W_i / T_i$  indicates the proportion of full-time women teachers as the tutors of the  $i^{\text{th}}$  master’s degree candidates among nationwide tutors of the same category, and  $M_i / T_i$  represents the proportion of full-time men teachers as the tutors of the  $i^{\text{th}}$  master’s degree candidates among nationwide tutors of the same category. The gender segregation Ds index of campus women teachers as master and PhD’s degree candidates in regular institutions of higher learning in China during 2007~2016 is calculated and denoted as Ds2 for distinguishing, as shown in Table. In recent ten years, the gender segregation Ds index of full-time women teachers as tutors in nationwide regular institutions of higher learning was on the decline on the whole. Ds2 index went up from 2007 to 2008 and dropped from 2008 to 2013 for six consecutive years, and it increased again for a short time from 2013 to 201 and then plummeted in 2016 to 20.40. The mean value of Ds index in recent ten years was 21.23 and larger than 0. Compared with men counterparts, as the candidate level was higher, the proportion of women tutors dropped dramatically, and the academic career ladder for women teachers was increasingly steep.

Table 1 Professional Title and Tutors of Master’s Degree Candidates of Gender Segregation Indexes (2007-2016)

year	2007	2008	2009	2010	2011	2012	2130	2014	2015	2016	Mean value
DS1	18.83	18.14	17.65	17.50	17.12	16.70	16.88	17.03	16.86	16.62	17.33
DS2	20.76	22.56	22.05	21.71	21.74	20.78	20.67	21.01	20.66	20.40	21.23

Remarks: calculation based on 2007~2016 national education statistical data of the Ministry of Education

## 4. Conclusions

Based on Ds index vertical segregation extent, the occupation gender segregation of full-time women teachers in nationwide regular institutions of higher learning during 2007~2016 are:

(1) The horizontal occupation gender segregation of full-time women teachers in nationwide regular institutions of higher learning is not significant. The vertical segregation is not serious but relatively significant.

(2) The gender segregation of women teachers in nationwide regular institutions of higher learning as tutors of PhD or master’s degree candidates ( $DS2$  mean value  $>$   $DS1$  mean value). The women teachers as tutors of PhD or master’s degree candidates and their occupation segregation

suggest that the “male oriented and female marginalized” academic structure in universities and colleges is not improved greatly.

(3) The gender segregation index Ds2 of women teachers in nationwide regular institutions of higher learning as tutors of PhD or master’s degree candidates during 2007~2016 varied slightly, and the occupation segregation index Ds1 varied greatly.

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## References

- [1] Yang Dingjin, Xu Congwei. Research on Occupation Gender Measurement [M]. Hefei University of Technology Press, 2016.
- [2] Abramson, Joan. The Invisible Women: Discrimination in the Academic Profession [M]. San Francisco: Jossey-Bass, 1975.
- [3] Carter, Susan B. Academic Women Revisited: An Empirical Study of Changing Patterns in Women’s Employment as College and University Faculty, 1890-1963[J]. Journal of Social History, 1981, 14: 675-699.
- [4] Stephen Kulis. Gender Segregation among College and University Employees[J]. Sociology of Education, (Apr., 1997), Vol. 70, No. 2: 151-173.
- [5] Bain O., Cummings W. Academe's Glass Ceiling: Societal, Professional-Organizational, and Institutional Barriers to the Career Advancement of Academic Women[J]. Comparative Education Review, (November 2000), Vol. 44, No. 4: 493-514.
- [6] Susanne Kreitz-Sandberg. Gender inclusion and horizontal gender segregation: stakeholders’ strategies and dilemmas in Swedish teachers’ education [J]. Gender and Education, 2013, Vol. 25, No. 4, 444-465.
- [7] Wu Yuxiao, Wu Xiaogang. 1982-2000: Study on Gender Segregation in Non-Agriculture Occupations in China [J]. Society, 2008(5): 128-155.
- [8] Li Chunling. Current Conditions and Changing Trends of Occupation Gender Segregation in China [J]. Jiangsu Social Science, 2009(3): 9-16.
- [9] Li Wang Yang, Xie Yu. Chinese Occupation Gender Segregation Trend: 1982-2010[J]. Society, 2016, 35(6): 153-177.
- [10] Su Minghui. Research on Occupation Segregation of Campus Teachers in Guangxi [D]. Guangxi Normal University, 2004: 12-18.
- [11] Lu Gengshu, Peng Zhengxia. Analysis of Gender Segregation in Campus Teachers’ Career Development [J]. Journal of Higher Education, 2010(8): 76-83.
- [12] Cheng Fang. Analysis of Barriers in the Career of Campus Women Teachers [J]. Journal: Education Research Monthly, 2011(7): 70-72.
- [13] Shen Hong, Xiong Junfeng. Occupation Gender Segregation and Gender Difference of Campus Teachers Incomes [J]. Journal of Higher Education, 2015, 35(3): 25-33.

- [14] Xu Peng, Zhou Changcheng. Gender Academic Career and Income Inequality of Young Campus Teachers [J]. Youth Study, 2015 (2):22-29.
- [15] Tong Mei. Research on Occupation Gender Segregation [J]. Journal of Lanzhou University (Social Science Edition), 2014(3):141-146.
- [16] Tong Mei, Wang Hongbo. Market Transition and Occupation Gender Vertical Segregation [J]. Society, 2013(6):129-145.
- [17] Wu Yanyun. Analysis of Profession Development of Women Teachers in Guangdong Province Universities and Colleges-Take Guangzhou City for Example [J]. Higher Education Exploration, 2013(6):156-160.