A Study on University Undergraduate Teaching "Cask Effect" by Big Data Technology

Chen Chen
Institute of Higher Education, East China Normal University, Shanghai, 200062

Abstract: This paper explores the teaching status of different types of undergraduate colleges and universities from the perspective of the investment of teaching funds and the existing teaching problems. The results show that the hierarchical characteristics of the higher education system in China are generalized in undergraduate teaching, and there are significant differences in the teaching resources enjoyed by different types of colleges and universities, which are manifested in the differences in the investment of teaching funds. In addition, there are different "deficiencies" for different types of institutions in the overall school-running resources, the construction of the contingent of teachers, the orientation of talent training. In order to achieve first-class teaching, undergraduate students should recognize the phenomenon of "cask effect" in teaching, strive to break the circle structure of the existing university system, innovate the incentive mechanism of teachers, ease the "academic ratchet", and clarify the goal and orientation of running a school, so as to achieve the first-class undergraduate education strategic objectives.

1. Difference in the Investment of Undergraduate Teaching Funds by Big Data Technology

In order to explore the difference of investment in teaching funds of different types of colleges and universities, on the basis of learning from Professor Guo Jianru of Peking University and others to classify the types of colleges and universities, 105 colleges and universities in Shanxi, Gansu and Fujian provinces were divided into three types of schools. The basic classification of institutions is shown in Table 1-1. Because the average teaching of students, the output value of scientific research instruments and equipment (10,000 yuan/student), the daily operating expenses of undergraduate teaching (10,000 yuan) and the ratio of student to teacher, are more complete and comparable in the quality report, it also uses the indicators of teaching funds, for the test of the difference in the investment of teaching funds for different types of schools (directly under the Ministry of Education, co-sponsored by the province and the ministry, provincial key university, provincial general institution) so as to compare the difference of teaching expenditure among different colleges and universities. The results are as shown in Table 1-2

| project                    | Directly under the Ministry of Education | Local undergraduate colleges and universities |
|----------------------------|------------------------------------------|-----------------------------------------------|
| Research-oriented universities | co-sponsored by the province and the ministry | provincial key university(major established undergraduate institutions) |
| Xi'an Jiao Tong            | Xi'an University of                      | Lanzhou Jiaotong                              |
|                            |                                          | Xi'an College of Arts                         |
Institution examples

| University                          | Technology                                | University                          | and Sciences              |
|------------------------------------|-------------------------------------------|-------------------------------------|---------------------------|
| Xidian University                  | Xi'an University of Science and Technology| Fujian University of Technology     | Xianyang Normal University|
| Northwestern Polytechnical University| Northwest University for nationalities    | Fujian University of traditional Chinese Medicine | Yulin College            |
| Xiamen University                  | Lanzhou University of Technology          | Minnan Normal University            | Gansu Institute of Political Science and Law|
| Lanzhou University                 | Fuzhou University                         | Xiamen Institute of Technology      | Tianshui Normal University|

Table 1-2: Test on the difference of teaching investment in different types of colleges and universities

|                                              | quadratic sum | df | mean square | F     | conspicuousness |
|----------------------------------------------|---------------|----|-------------|-------|----------------|
| Average student teaching, scientific research equipment           | interblock    | 117.37 | 3 | 39.12 | 17.10 | .000 |
| value (ten thousand yuan/student)              | Intragroup    | 196.87 | 86 | 2.29  |       |      |
| Expenditure on daily operation of undergraduate teaching (ten thousand yuan) | interblock    | 559679828.40 | 3 | 186559942.80 | 19.05 | .000 |
| amount to                                     | Intragroup    | 724586890.12 | 74 | 9791714.73 |       |      |
| the ratio of student to teacher               | interblock    | 63.94 | 3 | 21.32 | 3.06  | .033 |
|                                              | Intragroup    | 635.73 | 91 | 6.70  |       |      |

In Table 1-2, the F values were 17.10, 19.05 and 3.06, respectively, and the p values were all less than 0.05, which indicated that there were significant differences in the investment of teaching funds among different types of colleges and universities. By the method of Least Significant different, it was found that in the variables of teaching and scientific research assets per student, the average value of the universities directly under the Ministry of Education was significantly higher than that of the co-founded colleges and universities of the province, and the provincial key colleges and universities and the provincial general colleges and universities, with the average difference of 40,810 thousand per student, higher than the provincial general colleges and universities. Average student teaching and the value of research equipment of provincial key university is only higher than that of the provincial general colleges and universities, which is 0.53 million/student, and is lower than that of the institutions directly under the Ministry of Education, and co-sponsored by the province and the ministry. For the variable of the daily running expenditure of the undergraduate teaching (10,000 yuan), the average value of the daily running expenditure of the institutions directly under the Ministry of Education is higher than that of the institutions co-sponsored by the province and the ministry, provincial key universities, provincial general colleges and universities, of 7929.65 (ten thousand Yuan), 7152.45(ten thousand Yuan), and 9450.09(ten thousand Yuan). The daily expenses of teaching in provincial general colleges and universities are at the lowest level. In combination with the ratio of student to teacher, this ratio in provincial general colleges and universities is relatively smaller than that of the institutions co-sponsored by the province and the ministry, provincial key universities, but the investment in teaching funds is the highest. According to the overall data presented in the undergraduate teaching quality report of 105 colleges and universities, there are obvious differences in the investment of teaching funds in different types of colleges and universities: the investment of teaching funds in colleges and universities decreases with the reduction of the level of attribution of colleges and universities.

2. The Concrete Manifestation of the Crux of Undergraduate Teaching Problem

In order to further reveal the "cask effect" phenomenon in the teaching of the undergraduate course, from the undergraduate teaching quality reports of Shaanxi, Gansu and Fujian provinces, the author used the way of purposive sampling, selected three texts of the institutions directly under the Ministry
of Education, 6 texts from provincial key universities, and 9 texts from local general institutions, the teaching problems are extracted and summed up in order to further peek into the differences of teaching problems in different types of undergraduate colleges and universities. Through the comparative study, it is found that the difference of the funds for running a school directly leads to the gap of the teaching funds, and then restricts the quality of the talent training. In addition, the construction of teachers, the classroom teaching mode, the orientation of talent training, and so on, are puzzling teaching in different degrees. Because of the different types of colleges and universities, the "long plate" and "short plate" of different types of colleges and universities are different, with more obvious difference.

3. Teachers' Reserve and Rational Flow in Colleges and Universities are the Cornerstone of Teaching Promotion

As far as higher education is concerned, teacher faculty is an important aspect directly related to the quality of education, and its influence on teaching is more self-evident. Through the analysis above, it can be found that in research-oriented universities represented by universities directly under the Ministry of Education, high-level talent reserves are relatively abundant, which is not the key to puzzling teaching problems in such colleges and universities, which stems from the cluster effect of talent flow. Because of its academic reputation and the superiority of the resource platform, the traditional research-oriented universities have a more concentric force to attract talents, which is the basic factor leading to the traditional research-oriented universities. In contrast, the need for high-level person-times in key provincial colleges and universities is more stronger, and some colleges and universities do not hesitate to spend "generous salary" looking for talents with all kinds of honorary titles, and even staged a war of "scramble for talents", which is not only harmful to the development of academic ecology in colleges and universities, but also leads to the disorder of talent flow in the academic market. Such colleges and universities should attach importance to external guidance and perfect the incentive and guarantee system of teachers, so as to attract "talents" to the connotation and cultural construction of colleges and universities. For local undergraduate colleges and universities, "high-level" talents with a single academic standard are not what they need. What this kind of colleges need is "double-position" teachers. This kind of colleges and universities should strengthen the introduction of part-time teachers from other universities to realize the communication of teaching level, timely pay attention to the needs of social practice, and lead the part-time teachers from the enterprise environment to make up for the shortage of teachers faculty. In a word, the training and reserve of such teachers should be the key work of this kind of colleges and universities.

The key of undergraduate education quality lies in the quality and level of teaching. Colleges and universities should fully respect the teaching input of teachers, regard teaching activities and scientific research activities as academic categories, with the same affirmation and encouragement, and even more emphasize teaching activities and more encouragement to teaching innovation, to realize the double-first-rate teaching and then the double-first-rate construction of the university. But the double-first-rate construction of teaching is not the first-class of a few. It is not limited to the research-oriented universities, with the present subordinate as the main, but for all different types of colleges and universities. Ordinary undergraduate colleges in local universities are different from traditional academic universities, but also different from existing vocational and technical colleges. In terms of talent training, as higher education itself is an open system, it is not necessarily in close agreement with the economic development of the region and the employment structure, so the transformation of the industry and the cultivation of talents cannot delineate a fixed area.

4. Conclusion

The cause of "ratchet effect" is reflected in the endogenous and exogenous factors mentioned above, and its response in the teacher's individual level is the professor's trade-off of personal income. This income includes both material (like, income treatment) and spiritual aspects (academic title, reputation, personal ambition). Not only that, in terms of the launch process of the profession of the individual,
there is also a "ratcheting effect". The more reputable the scholars are, the more various research grants they receive, the more likely they are to devote more time to research rather than undergraduate teaching. In that case, it leads to the formation of the "Matthew Effect" and "Snowball Effect" of scientific research. In addition, the influence of "administrative lattice" makes the academic power of undergraduate teachers decline, its scientific research and teaching gradually reduced to a task of completing assessment and seeking promotion to complete, not based on a sense of responsibility, a sense of mission. And in the course of the game between the two sides, the biggest victim is the benefit of the third party, that is, undergraduate students. So for different reasons, the types of undergraduate colleges and universities should find out the root of the problem of "contradiction between teaching and scientific research", and create a good atmosphere of respecting and loving teaching for university teachers from the aspects of teaching system, teaching culture, and so on. Alleviating the phenomenon of "academic ratchet" is the good way to boost the teaching input.

In a word, facing the phenomenon of "Cask Effect" in undergraduate teaching, different types of colleges and universities should not evade their own teaching weaknesses, and should "find specific ways to solve problems", break the circle structure of the university system, and innovate the teacher incentive mechanism, respectively, as well as alleviate "academic ratchet" and other aspects to improve their teaching environment. Colleges and universities should also make full use of the opportunity of quality reporting, strengthen the basic position and central role of undergraduate teaching, create a teaching atmosphere of respecting and loving teaching, improve teachers' awareness of undergraduate teaching quality, solidify the culture of teaching quality, and guide college teachers to devote their energies to impart knowledge and educate people. This is the meaning of undergraduate teaching quality report, but also the state of undergraduate teaching development.

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