

The Reason, Solution and Empirical Evidence of Chinese School Can't Cultivate Outstanding Talents

Ding Xiaoliang^{1,2}

¹Hunan College of Foreign Studies, Changsha, China

²Gengdan Institute of Beijing University of Technology, Beijing, China

Email address:

1424788002@qq.com

To cite this article:

Ding Xiaoliang. The Reason, Solution and Empirical Evidence of Chinese School Can't Cultivate Outstanding Talents. *International Journal of Education, Culture and Society*. Vol. 8, No. 4, 2023, pp. 195-203. doi: 10.11648/j.ijecs.20230804.17

Received: July 11, 2023; **Accepted:** July 31, 2023; **Published:** August 15, 2023

Abstract: This paper analyzes the phenomenon that "why our school can't cultivate outstanding talents?" Pointed out the reason is that the direction of talent cultivation in Chinese schools is unreasonable, focusing on the benefits of batch training of labor force and neglecting the benefits of personality growth of talents. If we want to take both into account under the condition of limited teaching resources, the essence of the problem is to promote teacher-student behavior and institutional change through rational redistribution of limited resources. Therefore, the author designed and implemented the teaching reform solution. On the one hand, reform the traditional class teaching system and the credit system, adopt the teaching content, education methods and teaching system that encourage students' personality growth; on the other hand, establish a six closed loop quality management system for all students, teachers, courses, majors, secondary colleges and functional departments. The teaching comparative experiments prove that the redistribution of teaching resources along the direction of improving market efficiency and talent cultivation efficiency is conducive to the growth of students and the improvement of the overall competitiveness of the school. It also proves that the Model of Promoting Institutional Change Through Optimized Allocation of Limited Resources (PICOALR Model) can be applied to the field of education.

Keywords: Qian Xuesen's Question, Batch Training of Labor Force, Talent Personality Growth, Education Mode, Solution, Efficient Allocation of Resources, Comparative Experiments

1. Introduction

China's higher education has entered the stage of popularization [1]. However, China's higher education is still big but not strong, which is why Qian Xuesen sighed: "Now China has not fully developed, an important reason is that no university can run a school according to the mode of cultivating scientific and technological invention and creation talents, and there is no unique innovation of its own, 'Always unable to emerge outstanding talents.' That's a big problem." [2] In order to solve this problem, it is necessary to start with reforming the talent cultivation mode.

The current education mode of most schools in China and many other countries in the world is essentially a "unified and one-size-fits-all industrialized education mode" [3] and the class teaching system [4], established for the needs of batch

talent cultivation after human society entered the industrialization stage. The main advantage of this mode is that the cost of talent cultivation is low, which can meet the efficiency needs of society for batch training of labor, but its drawbacks are also very obvious. As Dewey criticized, "Everything is prepared for 'silent listening'" [5]. Harry Lewis, former president of Harvard College, said: "Universities have forgotten that their greater educational responsibility for the growth of college students is to help them find themselves and their own mission." [6]

How to meet the social demand for batch training of labor while also considering the personalized growth of talents? This is actually a common problem faced by all universities over the world.

2. An Educational Model That Takes into Account Both Students' Personality Growth and Batch Cultivation

Earlier in life, the author had proposed and empirically demonstrated a model that in the case of mismatched existing resources, we can promote group behavior and institutional change by redistributing limited resources between different departments or directions in the direction of improving market efficiency, and gradually readjusting existing resources allocation through optimal allocation of incremental resources (hereinafter referred to as the Model of Promoting Institutional Change Through Optimized Allocation of Limited Resources, PICTOALR Model) [7, 8]. Applying this model to the field of education, the author has proposed an institutional migration model that helps teachers and students to realize the transition from "textbook centered, teacher centered, classroom centered" to "student-development-centered, student-learning-centered, and learning-effectiveness-centered", and has obtained empirical evidence [9].

2.1. The Reasonable Allocation Model of Talent Training Resources

The essence of balancing the both benefits of students' personality growth and the benefits of batch training for labor force under the condition of limited teaching resources is also the problem of promoting institutional change through the rational redistribution of limited resources. Namely, the problem could be solved by PICTOALR Model. It can be analyzed as follows.

Assumptions:

- (1) Each person in society not only needs to develop their unique personality [10], but also needs to meet basic social behavioral norms as a member of social animals.
- (2) Human growth is the combination of innate talent and external environment. Genes are innate, but is it true that a person with talent is bound to grow? This is not necessarily true. A person's natural ability to grow requires an appropriate external nurturing environment, which is actually the fundamental responsibility of education.
- (3) From an economic perspective, the benefits of education on talent cultivation can be divided into two directions: one is the benefit of encouraging talent personality growth; another one is the benefits of batch training of labor force. The former is conducive to the development of individual abilities, temperament, personality, and interests, and stimulates talents to discover and invent laws; the latter mainly fulfills the social functional training needs of labor force and the shaping of people by social values. The corresponding allocation of cultivation resources can also be divided into these two directions. In order to simplify the problem, we will not consider the shared information

resources temporarily, but this does not affect the main conclusions drawn from the following analysis, as the information resources always need to be combined with certain human and material resources to function.

- (4) Students' mental resources are limited. If the school's course selection and credit system do not have sufficient flexibility, it will be difficult for students to simultaneously develop their unique personal interests and expand their personal talents when their limited mental resources are mainly used to meet the school's requirements for batch training and assessment.
- (5) The teaching resources that schools can use to cultivate talents are also limited. If teachers and students are not given the freedom to decide on teaching content, teaching methods, and evaluation methods, the limited teaching resources of schools are difficult to simultaneously use for students' personality growth when mainly used to meet the batch training and assessment requirements of society.
- (6) It is further assumed that the proportion of teaching resources used in the direction of "Batch Training of Labor Force" and the direction of "Talent Personality Growth" is relatively fixed. This is because during the process of institutional change, there are self-reinforcing and increasing reward mechanism for vested interest groups.
- (7) If the resources used for talent growth are fully allocated, i. e. there is no efficiency loss in resource utilization, then there existed the possibility boundary for talent cultivation resource utilization determined by specific cultivation resource endowments (including not only the teaching resources of the school, but also the mental resources of students) [11], as shown in OCD of Figure 1.

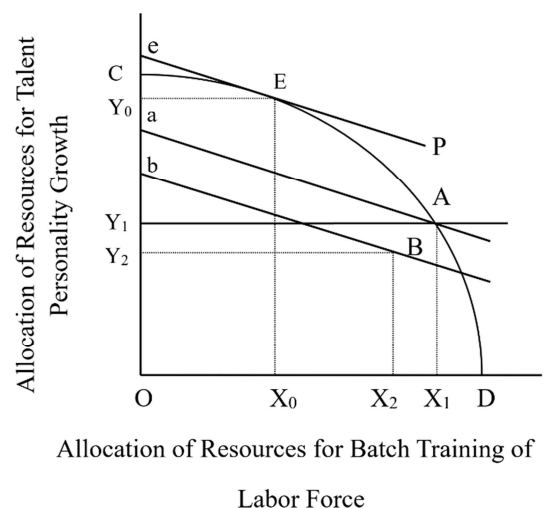


Figure 1. Problems in China's talent cultivation portfolio.

With the popularization of higher education, the training needs of general labor force in society have been basically met. The supply of general labor is very abundant, and creative talents are even more scarce.

In the field of ideology, the conventional explicit

knowledge (such as various textbooks) and implicit knowledge (such as videos on craftsmanship and experience) that used to be taught by teachers face to face are now readily available on the internet. People can learn at home and collaborate remotely on research and work. Society has entered the era of "mass accelerated innovation" [12], with more people participating in innovation and the speed of innovation accelerating. Every person, every company, and every country need more innovation if they want to avoid being eliminated, and they need to expand the talent cultivation possibility boundary as far as possible under the condition of limited cultivation resources. Therefore, the unidirectional indoctrination classroom and the class-based teaching system these are designed for "silent listening", are no longer suitable [13]. The extraordinary explicit knowledge (knowledge first proposed, such as Einstein's theory of relativity) and extraordinary implicit knowledge [14] (such as invention) have become more scarce elements.

If the education and employment structure is market-oriented, the income level of creative and personalized talents will be higher than that of batch trained labor. The market will allocate more resources from limited educational resources to produce scarce elements. Therefore, compared to before, in the process of talent cultivation, it is necessary to allocate relatively more resources OY_0 to encourage personality growth of talent, while relatively less resources OX_0 need to be allocated for batch training of labor. The optimal talent cultivation portfolio should be located at the tangent point of the possibility boundary for talent cultivation resource utilization and the relative price line EP determined by the market [11], which is point E in Figure 1.

Under the above assumptions and external conditions, the inevitability of talent personality growth and its spillover social effects those were brought about by different genes will be inevitable. For example, the discovery of scientific laws by genius, the promotion of new products and the new combination of resource elements by excellent entrepreneurs, are all conducive to the progress of the entire society and further investment to education. Society will enter a positive cycle of talent cultivation promoting economic development, and economic development nurturing talent cultivation. Correspondingly, the possibility boundary for talent cultivation resource utilization will be further expanded.

Taking the United States, which is highly competitive in the market and has already popularized higher education, as an example, it provides students with ample freedom to choose courses and majors for growth. This is equivalent to allowing students to invest more mental resources in the direction suitable for their personality growth, thus cultivating more creative talents.

2.2. The Actual Situation and Main Problems of the Allocation of Talent Cultivation Resources in China

In China, the agricultural civilization that has lasted for thousands of years has led to a culture characterized by valuing agriculture over commerce, natural economy, being attached to one's native land and unwilling to leave it, and

acquaintance society. Therefore, it is convergent and aggregated [15]. As a result, from Emperor Wu¹ of Han Dynasty's "Ousting all schools of thought and respecting Confucianism alone" to modern times, Confucianism has always dominated the intellectual world.

Confucianism originated from the patriarchal society of the agricultural nation, emphasizing collective consciousness and undervaluing individual independent thinking [16]. This cultural environment results in fewer divergent thinkers and more convergent thinkers among the population, forming the tradition of knowledge and value instilling [15]. Coupled with the inertia of the planned economy in the education system (such as the fact that enrollment quotas and training programs in universities are still controlled by the education management department of government, and there are unequal financial subsidies for public and private schools, etc.), all of these have led to a greater emphasis on batch training of labor and neglect individual growth in the education structure. The educational resources occupied by the former expand from OX_0 to OX_1 in Figure 1. At the same time, due to the limited cultivation resources, the education of personality growth is intentionally or unintentionally suppressed (represented by the Y_1A line in Figure 1). For example, in most schools of China, most of the compulsory courses and professional growth paths for students are predetermined, and students do not have sufficient choices, they also missed the precious opportunity to learn to make choices, try and make mistakes, and take responsibility for their own choices in the process of school education. As a result, the possibility boundary for talent cultivation resource utilization has been compressed from theoretical OCEAD to actual OY_1AD , and the talent cultivation portfolio is located at point A instead of point E in Figure 1.

As we can see in Figure 1, the static result of suppressing personality growth education is: assuming there is no price distortion, there is an absolute quantity of ea and a relative quantity of ea/eo in the economy, this is a loss of talent cultivation efficiency due to improper talent cultivation direction. This efficiency loss will make it difficult for students to develop their unique personal interests and creative talents, and it is difficult for outstanding talents to emerge.

According to previous assumption 6, OX_1/OY_1 is relatively stable, then each talent cultivation process will repeatedly produce a relative amount of ea/eo talent cultivation efficiency loss. This will continue to seriously damage China's creative talent cultivation.

Qian Yingyi observed that Chinese education "has a high mean and a low variance in talent cultivation" [17] (p. 33). The underlying reason behind this phenomenon is that the current batch training system places more emphasis on homogeneous training, student exam results, but neglects student's individual growth.

Dewey once pointed out: "The education process has two aspects: one is psychological, the other is sociological. They are equal in rank and equal in value, and neither aspect can be

1 Liu Che, Seventh Emperor of Han Dynasty (156 BC -87 BC)

neglected; otherwise, bad consequences will follow." [5] Qian Xuesen asked: "Why do our schools always fail to cultivate outstanding talents?" [18] The reason behind this phenomenon is that the talent cultivation direction of Chinese schools is unreasonable, paying too much attention to the training of people's social functions and the benefits of batch training of labor force, but neglecting the education of talents' personality growth. For example, China's Vocational Education Law has been criticized by scholars as having an obvious "instruments-based value orientation" [19].

Moreover, considering the low efficiency of resource allocation for recruiting and cultivating students through a planned economy, there is a lack of effective competition. At the same time, multiple government departments manage vocational education, with overlapping functions and segmentation, further aggravating the efficiency loss of talent cultivation. On the one hand, this leads to what college students have learned is not required by the market and are unemployed upon graduation²; on the other hand, it also makes it difficult for production departments to recruit suitable technical workers. In fact, China's talent cultivation portfolio is located within the possibility boundary for talent cultivation resource utilization, such as point B in Figure 1.

Before 2010, China's economy was still in a stage of catching up and surpassing, and it was still possible to imitate and learn from the successful experience of developed countries in economic development. But after 2010, China's GDP has surpassed Japan, becoming the world's second largest economy. In many technological fields, China is already at the forefront of the world and has no successful experience to draw on. It can only rely on innovation. In recent years, China has also faced lockdowns and supply disruptions in advanced technology products from the United States. Therefore, China's education sector must take into account and even highlight the personality growth of talents while cultivating labor in batches.

3. A Teaching Solution That Balances Personality Growth and Batch Training

Among the seven assumptions in the above educational model, assumptions 4 and 5 are conditional, that is, there are rigid requirements for what students learn and what teachers teach. This is actually the actual situation of most Chinese universities at present, and that should be the focus of the next teaching reform.

3.1. Teaching Content and Educational Methods That Encourage Personality Growth

Confucius has proposed teaching students according to their aptitude for more than 2,000 years, but this ideal has not

truly been realized [3]. Ren Zhengfei once said, "I hope that in 20 or 30 years, China will become an innovation center". But innovation first requires each individual to think independently, so students must be "educated differently to inspire their innovation spirit." [21]

Sukhomlinsky has been engaged in lifelong experimental research on "comprehensive and harmonious development of personality" education [22], emphasizing that "personalized cultivation should be implemented in teaching" [23]. Montessori emphasized that educators must trust the inherent and potential power of the educated [24], and respect the spontaneous choices of children [25].

To break through the dilemma of Qian Xuesen's question, what can and should be done is to cultivate people as human beings, discover students' talent and help them to develop, rather than only cultivating people as labor force.

"It should be noted that there are significant personality differences, and efforts should not be made to forcibly include all students in a single type or model." [5] The traditional classroom teaching system in the existing education system that focuses on batch cultivation, should be reformed, gradually relaxing the rigid requirements for students to have unified classes and take unified examinations, taking into account both personality growth and social function training, and increasing the teaching content, education methods, evaluation methods that focus on stimulating students' personality growth [17] (p. 422-441). For example, sign a learning contract with students [26] or a commitment letter for self-study courses [27] (p. 82), implementing a combined credit system [28], and allowing students to choose courses based on their own interests throughout the school while meeting the quality of teaching [3, 27], allowing students to independently choose personalized growth paths; implement Montessori teaching method for adults [24], Peer Instruction [29], and workroom teaching [9], and implement international education at home on the basis of voluntary participation of teachers and students [13]; at the same time, add assessment content and indicators that are conducive to stimulating students' personality growth in the teaching quality evaluation system, and increase the weight of process evaluation [30] etc.

3.2. Education Methods That Take into Account the Quality of Batch Training

While paying attention to the personalized education of students, the overall training quality of students should not be relaxed. Therefore, it is necessary to establish a six-closed-loop quality management system for students, teachers, courses, majors (teaching and research offices, workrooms), second-level colleges, and functional departments [30]. Professional college contracts accommodation academy management [31].

3.3. Make Necessary Adjustments to the Talent Cultivation Plan

According to the discussion in the second part of this article, there exists an optimal talent cultivation portfolio under the

2 In April 2022, the surveyed urban unemployment rate of people aged 16-24 in the Chinese mainland reached 18.2%, a new high since the data was regularly released in January 2018. [20]

conditions of complete market competition. Therefore, we should restructure the curriculum system in the direction of encouraging more personality growth and reducing batch training of labor force. This requires increasing the number of development paths that students can choose from and the proportion of courses that can be chosen from different development paths in the talent cultivation plan as much as possible, in order to stimulate students' enthusiasm for independent learning as much as possible.

4. Empirical Cases

Empirical cases related to the combined credit system [28], allowing students to choose courses based on their own interests throughout the school while meeting the quality of teaching [3, 27], Montessori teaching method [24], and international education at home [13] have already been introduced in relevant references and will not be repeated here. This article focuses on the introduction of comparative experiments about Peer Instruction and workroom teaching, as well as the empirical case of the six closed-loop quality management system.

4.1. Comparative Experiment on Peer Instruction

During the COVID-19 epidemic in the first half of 2020, the author and colleagues organized a Peer Instruction

comparison experiment in Hunan College of Foreign Studies. The method was to randomly select the 11th class of three-year nursing, the 7th class of five-year nursing and the 20th class of three-year midwifery in grade 2019 as the control group. The dormitory was used as the learning group and the online teaching method was adopted for above control group. Randomly select the 12th class of three-year nursing, the 8th class of five-year nursing and the 19th class of three-year midwifery in grade 2019 as the observation group. Apart from using the dormitory as the learning group and adopting the online teaching method, the students with strong academic ability and those with weak academic ability within the observation group were paired together to form an one-to-one combination and carry out Peer Instruction. Experimental comparisons were conducted between the control group and the observation group with students of the same course, same teacher, and same grade with similar learning levels. The effect of Peer Instruction method was compared by quantitative assessment and questionnaire survey.

Table 1. Comparison of the average total learning time of core subjects within 5 days after class (hours/person).

Group name	Average learning time
Observation group	8.8±0.5
Control group	3.03±0.2

Table 2. Comparison of course test scores.

Group name	Average score (points)	Proportion of students with 60 points and below	Proportion of students with 60-69 points
Observation group	83.54±0.7	0.016±0.005	0.07±0.01
Control group	76.99±0.8	0.065±0.005	0.19±0.02

Table 3. Percentage of the total scores of 63 questions in the Growth Thinking Questionnaire [32] in each score segment (%).

Group name	189 points below ⁱ	189-200 points	201-300 points	301-315 points
Observation group (OG): Five-year nursing class 8 (46 students)	23.91	34.78	41.30	0.00
Control group (CG): Five-year nursing class 7 (50students)	44.00	24.00	32.00	0.00
OG: Three-year nursing class 12 (47students)	36.17	12.77	51.06	0.00
CG: Three-year nursing class 11 (43 students)	51.16	4.65	44.19	0.00
OG: Three-year midwifery class 19 (44 students)	43.18	18.18	36.36	2.27
CG: Three-year midwifery class 20 (45 students)	62.22	6.67	31.11	0.00

i: Critical value, equivalent to 50 points on a 100-point scale. The larger the score, the higher the degree of growth thinking.

From Table 1, it can be seen that the observation group showed a significant increase in students' extracurricular learning time investment compared to the control group. Students' learning engagement has a significant positive impact on learning outcomes [33, 34]. Correspondingly, Table 2 and Table 3 show that the observation group's students' course test scores and growth thinking level are significantly higher than the control group.

A school's most abundant resource is its students. Today, with all kinds of knowledge available on the Internet, students don't have to go to school if they only want to learn knowledge. In today's era, the original meaning of school should be more like "a place for students to find peers" [3]. The above case shows that through the interaction between teachers and students, students with strong learning ability are organized to

realize the interaction between students and students, and students with strong learning ability help students with weak learning ability. For the students who are weak in learning, they got personalized counseling; for students with strong learning ability, it was a process of output learning to drive input learning [13], and it is an exercise for transferability. This is also a process of integrated penetration liberal education and integrated whole-person education [35]. It helps to achieve common progress of students' learning community.

4.2. Comparative Experiment on Workroom Teaching

In 2017, Gengdan Institute of Beijing University of Technology, relying on its engineering management major, collaborated with Beijing Flatfish Engineering Consulting Co., Ltd., a leading enterprise in the BIM field, to establish the

"Flatfish-Gengdan BIM College". For students, this industrial college is a workroom that relies on professional teaching and research office, holds hands with industry leading enterprises, and integrates industry practice to carry out teaching; for enterprises, it is a base for continuously cultivating follow-up talents, reducing costs, and utilizing school resources to train social talents.

The workroom adopts a complementary teaching solution of "daily teaching + extra-curricular tutoring + centralized training + competition breakthrough + project connection",

and connects students' learning in class and after class in the way of "classroom + workroom + students' professional learning club". Under the premise of ensuring the regular teaching and training plan, after class, centralized training on the application of BIM for all students of the major has been conducted. By utilizing the opportunities of campus competitions and national competitions to quickly break through practical abilities, it would ultimately be integrated with practical projects in the market, creating an innovation and entrepreneurship platform for students.

Table 4. Number of students majoring in engineering management who voluntarily joined BIM workrooms and their proportion in the grade.

Grade	Number of students joining BIM Workroom	Proportion
2014	10	9.3%
2015	13	17.3%
2016	22	32.3%
2017	18	32.7%
Total	63	20.6%

In order to fully mobilize the enthusiasm of students, the major adopts the way of students voluntarily joining the workroom. Table 4 shows the number of students in different

grades of the major who voluntarily joined the BIM workroom and their proportion in the grade.

Table 5. Comparison of some courses scores of workroom students and non-workroom students in 2014 grade (experimental class).

Course title	Workroom students' average score	Non-workroom students' average score	The average score of the whole class
BIM and cost management applications	87	80	83
Revit technology application	93	83	84
Theory and Practice of Career Guidance for College Students	87	79	80
Administrative management methods and practices	86.6	84.6	84.8
Enterprise management tool application	91	75	77
Professional literacy and self-management	91	89	89.2

Table 6. Comparison of some courses scores of workroom students and non-workroom students in 2014 grade (regular class).

Course title	Workroom students' average score	Non-workroom students' average score	The average score of the whole class
BIM and cost management applications	82.3	76.8	79.2
Revit technology application	89	76	75
Theory and Practice of Career Guidance for College Students	68.8	76.6	76
Administrative management methods and practices	88	78	78.6
Enterprise management tool application	90.7	74.6	76
Professional literacy and self-management	86.4	84.9	85

Tables 5 and 6 are the comparison of some courses scores of 2014 grade students in this major. It can be seen that the average scores of students in the same class who join the workroom are generally higher than those of students who do not join the workroom. It proves that workroom teaching with respect to students' wishes can indeed help students to develop and improve their scores.

Through workroom teaching, it also helps to develop students' leadership. For example, Mr. Xia Tian, a graduate of this major in 2019, was hired as the manager of BIM Center of China Coal Company when he was near graduation, and he interviewed graduates from first-class universities. Why can a private university graduate do this? Because he once served as the head of the BIM Workroom student learning community, he did not go home every weekend but to give lectures to his younger brothers and sisters. This shows that through the training of professional learning clubs, students can not only

learn professional knowledge, but also can develop their transferable abilities such as leadership, communication, and collaboration.

4.3. Six Closed-Loop Quality Management System Case

After China's higher education enters the popularization stage, the management of higher education in the future will be in a normalized evaluation and closed-loop adjustment stage. There is an urgent need to establish a closed-loop quality assurance system for iterative improvement [30], guiding and evaluating students, teachers, courses, majors (teaching and research offices), secondary colleges, and functional departments. Internalize the culture of cultivating moral character, adjusting the teaching method structure, teaching content structure, teaching evaluation structure, linkage between teaching and learning, all staff educating

students, educating students throughout whole process, and educating students from all directions, the iterative improvement mechanism etc., in the quality assurance system (KPI/OKR indicator system) and implementation process. By evaluation, the overall teaching quality can be improved while increasing individual selectivity among students and teachers.

For example, the quality management closed-loop of a secondary college mainly consists of the college's semester task performance, daily management performance, and a mixed approach of 100% teacher survey and random sampling of 15% student evaluation. The method is to break down the main semester tasks and daily management indicators to be assessed according to whole school's five-year development plan. Except for some baseline task indicators that must be completed this semester, most key performance indicators (KPI) do not specify the specific values that each secondary college needs to achieve, but are ranked by comparing the output results of each secondary college. The Performance-related pay for the semester (about 19% of the total salary) is linked to the above ranking, this promoted the formation of a mechanism of learning to catch up and surpass each other among secondary colleges. The ranking generated by comparing each secondary college is essentially OKR, and the combination of the above two is KPI plus OKR. KPI is a clear direction and bottom line to ensure that every unit does not do too poorly; OKR encourages every unit to constantly break through the ceiling in the competition process through comparison.

To illustrate the effectiveness, the following examples are provided.

In the past few years, the author and colleagues have implemented the comprehensive supporting reform of the combined credit system [28] and the international education at home [13] in Gengdan Institute of Beijing University of Technology. All the curriculum systems and content have been deconstructed and reconstructed in accordance with the direction of integration with industry. The courses are taught in English by local teachers have increased from zero to 12% of the total number of courses in the school. The secondary colleges and functional departments had conducted six rounds of closed-loop assessment and iterative improvement in accordance with the above quality management system, and the characteristics and competitiveness of the school were significantly enhanced.

According to the survey on the average monthly salary of the 2014, 2015 and 2016 graduates provided by a third-party big data company, although the average score of the college entrance examination of Gengdan Institute students is lower than the average level of similar institutions, however, after graduation, the average monthly salary of the graduates of this school is higher than the average monthly salary of graduates of similar institutions [9]. This indicates that the motivating student growth paradigm [13] has indeed added more value to the quality and abilities of the school's graduates.

On the basis of improving teaching quality, the tuition fee of the school has also been increased from over 10,000 RMB in 2014 to around 50,000 RMB in 2019. The improvement of

the overall competitiveness of the school has driven the improvement of teacher salaries and benefits. According to the survey conducted by the author, the treatment of teachers at Gengdan Institute is higher than the average treatment of teachers with the same professional title and level at other four private undergraduate colleges in Beijing.

5. Conclusion

Through the analysis of this paper, we understand that the reason behind Qian Xuesen's question is that the allocation of talent cultivation resources in Chinese schools is unreasonable, emphasizing the benefits of batch training of labor force and neglecting the benefits of personality growth of talents.

To balance human social function training and personality growth under limited cultivation resources, this is essentially a problem of promoting institutional change and teacher-student behavior change through the rational redistribution of limited resources. To this end, the author has designed and implemented a teaching solution that takes both into account. That is, on the one hand, the traditional class teaching system and credit system have been reformed, and teaching content and methods that encourage students' personality growth have been adopted; on the other hand, establish a six-closed loop quality management system for all students, teachers, courses, majors (teaching and research offices), secondary colleges, and functional departments.

The comparative experiment of Peer Instruction and workroom teaching, as well as the case study of the six closed-loop quality management system, have demonstrated that redistributing cultivation resources along the direction of improving market efficiency and talent cultivation efficiency can help students grow and improve the overall competitiveness of the school. It also proves that the Model of Promoting Institutional Change Through Optimized Allocation of Limited Resources (PICTOALR Model) can be applied to the field of education.

The author sincerely hopes that colleagues in the education community can take action, start from oneself, reform the traditional classroom teaching system and credit system, encourage students' personality growth, and cultivate more outstanding talents for the society.

Acknowledgements

The author sincerely thanks Ms. Wang Xiaowen, the Chairwoman of Gengdan Institute, for her supporting the author in promoting teaching reform at Gengdan Institute, as well as teachers Zhang Shuhong and Liu Weihua for the comparative experiment of workroom teaching. The author would also like to thank Mr. Ning Ping, Chairman of Hunan College of Foreign Studies, for his supporting the author's teaching management at the College; Ms. Yang Ling, Vice Dean of the School of Medical Health Management, for actively organizing the Peer Instruction comparison experiment; and Ms. Luo Fei, Director of the Mental Health Center, for her help in measuring students' growth thinking.

References

- [1] Sun Yahui. Higher Education: From Mass to Universal (China Education This Decade 2) [EB/OL]. Guangming Network, 2022-05-30. <https://m.gmw.cn/baijia/2022-05/30/35773379.html>.
- [2] Lu Feng. This Is the Real "Qian Xuesen's Question" [EB/OL]! Outlook Think Tank (zhczyj), 2020-08-31 <https://export.shobserver.com/baijiahao/html/285056.html>.
- [3] Li Xigui. Education for Individuals [M]. Beijing: Educational Science Press, 2014: 1.
- [4] Xia Zhengnong, Chen Zhili editor in chief, Lexicographical Work · Education Volume, Entry: Great Teaching Theory. Shanghai: Shanghai Dictionary Press, 2015.
- [5] Qiu Lei, Editor. Dewey Education Proverbs [M]. Shanghai: East China Normal University Press, 2015.
- [6] He Fan. He Fan's Book Club, Liberal Education 1: Why What Schools Teach You Might Be Wrong [Z]? Beijing: "Dedao" APP Course. 2017.
- [7] Ding Xiaoliang. The Economic Analysis on Reform of Chinese Science and Technology System [M]. Beijing: Science Press, 1998: 93-95, 143-144.
- [8] Ding Xiaoliang. The Laws That Should Be Followed in the Transition of Science and Technology System and Its Supporting Reform Model [J]. Studies in International Technology and Economy, 1998, 1 (2): 1-8.
- [9] Ding Xiaoliang. Design and Empirical Evidence of Teaching Resource Allocation Model and Reform Path [J]. International Journal of Education, Culture and Society, 2022, 7 (4): 220-226.
- [10] Zhu Zhixian. Great Dictionary of Psychology [M]. Beijing: Beijing Normal University Press, 1989.
- [11] Chen Xian, Yang Xiaosu, Chen Zhang, Dong Ruihua. Overview of Economic Methodology [M]. Beijing: China Economics Press, 1995: 291-294.
- [12] Chris Anderson. The Power of Speech [M]. Translated by Jiang Xianping. Beijing: CITIC Publishing Group Co., LTD, 2016.
- [13] Ding Xiaoliang. Research on the New Model of Growth Motivation in Higher Education [J]. University, 2020, (35): 5-11.
- [14] Fang Zhulan. On the Extraordinary Implicit Knowledge Management System in Silicon Valley and Its Enlightenment to China [J]. Journal of Capital Normal University (Social Sciences Edition) 2012, (1): 41-49.
- [15] Ding Xiaoliang. Why Are Chinese More Adapters and Westerners More Innovators? [M] // Ding Xiaoliang. Social Development 70 Q. Beijing: Finance Press, 2014: 93-99.
- [16] Ding Xiaoliang. What Are the Main Advantages and Disadvantages of Confucian Culture? [M] // Ding Xiaoliang. Social Development 70 Q. Beijing: Finance Press, 2014: 79-88.
- [17] Qian Yingyi. University Reform (Volume 1. University) [M]. Beijing: CITIC Press, 2016: 33, 422-441.
- [18] Zhu Changping, Peng Yinbing, Sun Mengqiu, et al. Research on Nobel Prize Winning in Japan and the Construction of Practical and Innovative Student Teams in Private Colleges [J]. International Journal of Education, Culture and Society, 2022, 7 (3): 150-157.
- [19] He Zhen, Liu Yunbo, Wei Ming, et al. 40 Years of Education Reform and Opening Up in China: Volume of Vocational Education [M]. Beijing: Beijing Normal University Press, 2019.
- [20] Tian Jin. Dialogue with Lu Feng from the National Development Research Institute of Peking University: The Youth Unemployment Rate Is 18.2%, the Key Is that Macro Growth Does Not Meet Expectations [N]. The Economic Observer, 2022-5-28 https://view.inews.qq.com/a/20220528A01T0300?refer=wx_ho&ft=0.
- [21] Book Sharing Sector Official Account. Full Text of the Minutes of Ren Zhengfei's Symposium in Four Universities in East China [EB/OL]. 2020-08-29. <http://www.readshare.cn/archives/10543.html>.
- [22] Xia Zhengnong, Chen Zhili editor in chief, Lexicographical Work Education Volume, Entry: Sukhomlinsky. Shanghai: Shanghai Dictionary Press, 2015.
- [23] Sukhomlinski Suggestions for Teachers [M]. Translated by Yu Changlin. Hangzhou: Zhejiang People's Publishing Company, 2021.
- [24] Ding Xiaoliang, Wang Chengjin, Yong Jinhui. Characteristic and Inspiration of Finland Education [J]. University Academic, 2018, (3): 66-71.
- [25] Wu Zhihong. Wu Zhihong's Psychology Course, Nurtures Your Spiritual Embryo [Z]. Beijing: "Dedao" APP Course. 2017.
- [26] Knight P. Learning Contracts. In, Assessment for Learning in Higher Education. Birmingham: SEDA series. 2002: 147-156.
- [27] Wang Chunyi et al. 100 Questions about Allowing Students to Choose Courses Based on Their Own Interests Throughout the School [M]. Beijing: China Renmin University Press, 2018.
- [28] Ding Xiaoliang, Yong Jinhui. Multiple Choice and Comprehensive Cultivation: A Practical Exploration of the Combined Credit System [J]. University Academic, 2017, (3): 40-47.
- [29] Mazur E. Peer Instruction: A Guide for College Physics Teaching [M]. Translated by Zhu Min and Chen Xianfeng. Beijing: Mechanical Industry Press, 2011.
- [30] Ding Xiaoliang, Zhao Junxian, Li Jingzeng. Establish a Closed-loop Multi-monitor Evaluation System of Teaching Quality- Taking Gengdan Institute of Beijing University of Technology as An Example [J]. University Academic, 2018 (5): 15-21.
- [31] Xu Xiaofei, Shen Yi, Zhong Shisheng, et al. Exploration and Practice of New Engineering Mode and Innovative Talent Training -- "New Engineering 'π-type' Program" in Harbin Institute of Technology [J]. Research on Higher Engineering Education, 2020, (2): 18-24.
- [32] Dweck C S. Mindset: The New Psychology of Success [M]. New York: Random House, 2006.

- [33] Su Linqin. Research on the Relationship between Learning Engagement and Learning Outcomes of Engineering College Students [J]. China Higher Education Research, 2020, (2): 70-76.
- [34] Yang Yuan, Li Yanna, Ding Nan. An Empirical Study on the Types of College Students' Learning Engagement and Their Relationship with Learning Outcomes [J]. Exploration of Higher Education, 2017 (3): 74-77.
- [35] Ding Xiaoliang, Yong Jinhui. The Integration of General Education into the Four-year Learning Process of University -- A New Path of Teaching Reform in Gengdan College [C]// Wang Mei. 2017 The Third Cross-Straits Integration Teaching and General Education Symposium Proceedings. Xinbei City: Southeast University of Science and Technology, 2017: 16-28.

Biography



Ding Xiaoliang, Male, Doctor of Engineering, Doctor of Economics, Research Fellow of Chinese Academy of Sciences (CAS), Eisenhower Fellow, Baise Education Foundation "Advanced Individual of Education Public Welfare", Zhongguancun Outstanding Entrepreneurial Overseas Students, Beijing Chaoyang District Academic and Technical Leader; World Eminence Chinese; Influence China's 100 Innovative Entrepreneurs; Former First Vice President of Hunan College of Foreign Studies; Former Executive Vice President, Gengdan Institute of Beijing University of Technology; Former Deputy Director General of Bureau of High Technology R&D, Bureau of Planning and Finance, CAS. Research Field: University Research & Management, Transition Society.