

Research on the Construction Path of University Teachers Facing New Engineering from the Perspective of Human Capital

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Abstract

The construction of new engineering to serve the major strategic needs of the country has entrusted universities with the sacred mission of cultivating a large number of excellent talents. The key to talent training lies in the teaching staff, and the quality and ability of teachers are embodied in human capital. From the perspective of human capital theory, teaching staff oriented to new engineering are faced with difficulties in team preparation, growth investment and efficiency. Actively adopting countermeasures to broaden the horizons of talent introduction, improve the level of human capital raising, improve training programs, ensure the effect of human capital investment, improve the use mechanism, and enhance the efficiency of human capital operation are important ways to solve the predicament of the teaching staff construction under the background of new engineering.

Key words: human capital, new engineering, teaching staff, talent training

1. INTRODUCTION

In order to actively respond to the new round of scientific and technological revolution and industry upgrading, and serve the major national strategies such as 'Made in China 2025' and 'Internet +', the construction of 'New Engineering' led by the Chinese government came into being. Cultivating a large number of high-quality compound talents, providing reliable intellectual support and talent guarantee for the national industrial development and international competition, has become the sacred mission entrusted to higher education in the new era. The key to talent training is teachers, as

Harvard President Conant said, the honor of university is not in its school buildings and the number of people, but its generation after generation of excellent quality teachers. The quality of teaching staff directly affects the effectiveness of student training, plays a key role in the connotation development of university, and has a profound impact on the construction of new engineering and the realization of major national strategies. The human capital level of university teachers is a direct reflection of the quality of teachers' team construction. It is the key to reflect the level of university education and improve the quality of personnel training. It is the source of value for teachers to obtain recognition and income. It is also the internal motivation that affects the behavior of universities and teachers. Therefore, from the perspective of human capital, it is of great theoretical and practical significance to study the practical difficulties faced by the construction of university teachers under the background of new engineering and explore the realization path of solving the dilemma.

2. THE CONNOTATION OF HUMAN CAPITAL THEORY AND ITS APPLICATION IN THE CONSTRUCTION OF TEACHING STAFF

2.1 The connotation of human capital theory

The theory of human capital was born in the early 1960s, which was proposed by Schultz, the Nobel Prize winner and then president of the American Economic Association. It was originally used to explain the phenomenon of rapid economic recovery and sustained growth in Western countries after World War II that cannot be explained by traditional theories, and to empirically test the important role of human capital in economic growth from a macro perspective. Subsequently, Becker further improved the human capital theory and proposed the human capital investment theory. He believed that human capital is the acquired capital formed through investment methods such as education and training, and empirically studied the important impact of human capital investment on individual income from the micro perspective. The successful application of human capital theory has attracted the attention of a large number of scholars, and the theory has been continuously improved. The application scope has gradually expanded to labor economics, human resource management, higher education, population economics and other fields.

According to Schultz's definition, human capital can be summarized as capital embodied in workers through investment, which is embodied in knowledge, skills, experience, health and other labor capabilities and qualities. Human capital and land, equipment, raw materials and other static physical capital, both have capital attributes, is the source of income. However, human capital also shows the special characteristics of dynamic, heterogeneity and initiative, which can significantly improve the production efficiency of physical capital. The human capital theory successfully

extends the concept of capital to people and capitalizes the value of people, revealing the internal mechanism of human development, which can effectively explain many economic and social problems.

2.2 The Necessity of Teachers' Human Capital Research under the Background of New Engineering

In the action line of new engineering construction, the Ministry of Education of China clearly puts forward that the core literacy of talent training includes global vision, legal consciousness, ecological consciousness, design thinking, engineering thinking, innovation and entrepreneurship, cross integration ability, communication and negotiation ability, engineering leadership, and the like. As the direct responsible person for students' training, teachers need to have the necessary labor skills, and these target qualities and abilities should be included in the category of teacher human capital to meet the needs of new engineering construction. Therefore, the composition of teacher human capital shows obvious diversity. At the same time, in the context of the construction of new engineering, the rapid development of science and technology, interdisciplinary in-depth integration, and the shortening of knowledge updating cycle have significantly enlarged many characteristics of human capital, including timeliness, dynamics, subjective initiative, and investment returns of human capital. These changing characteristics of human capital will lead to new phenomena and problems in the construction of teachers, and these problems need to find answers from the perspective of human capital theory. For example, under the background of new engineering construction, why university teachers can not meet the needs of talent training, why the effect of education and training of young teachers is generally better than that of middle-aged and elderly teachers. Therefore, it is necessary to combine the human capital theory with the research on the dilemma of teacher team construction in the context of “ new engineering ” to analyze the characteristics of human capital of university teachers facing new engineering, systematically study the dilemma existing in each link of teacher team construction and put forward the countermeasures.

2.3 Application of Human Capital Theory in University Teachers' Research

Human capital theory has strong explanatory power and unique perspective. Some scholars have made some achievements in taking university teachers as the research object. Lee implemented two-way fixed effect model, presented the results that the extent of accountability in the school system did not affect human capital, and suggested to fine-tune the accountability policy in order to strengthen teachers' human capital as well as social capital^[1]. Zhang proposed that the essence of teacher mobility is the flow of human capital, analyzed three contradictions that led to the disorderly flow of university teachers, and proposed to seek a benign mechanism for the orderly flow of talents between universities^[2]. Liu compared the differences between Chinese and

American university teachers' salary system from the perspective of human capital, and put forward some suggestions on promoting the reform of salary system, strengthening the external competitiveness of salary, and rationally formulating salary structure^[3]. Jia tested the impact of human capital on the efficiency of humanities and social science research with the statistical data of humanities and social science research in 22 universities in Guangxi Province China for 10 consecutive years^[4].

Since the construction of teaching staff oriented to new engineering from the perspective of human capital has different links, and the human capital of teachers presents a variety of characteristics such as human attribute and capital attribute in each link, these characteristics have not been paid attention to, causing many practical problems, and the existing theoretical research in these aspects is not deep enough. Therefore, from the perspective of human capital theory, this paper first clarifies the specific links of teacher team construction for new engineering, and then analyzes the characteristics of human capital in each link, studies the main difficulties faced by teacher team construction, and finally explores the countermeasures to solve the dilemma with human capital theory as a breakthrough, in order to provide reference for the decision-making of university teachers' team construction under the background of new engineering.

3. THE REALISTIC DILEMMA OF TEACHER TEAM CONSTRUCTION UNDER THE BACKGROUND OF EMERGING ENGINEERING EDUCATION

As a core capital held by universities, human capital existing in teachers is an important guarantee for universities to perform the basic functions of cultivating talents, developing science and technology and serving the society. This kind of human capital held by universities is attached to teachers, which can generate benefits and realize value increment, and has obvious capital attribute, which is highly similar to the capital held by enterprises. As one of the representatives of human capital theory, Nobel laureate Becker said, there is no need to always make clear the difference between schools and businesses, in some way, schools can be seen as a special type of business^[5]. Since the production and management activities of enterprise capital are mainly divided into three modules: financing, investment and management, and the key to the construction of university teachers under the background of new engineering lies in the human capital management of teachers, we can use the classification of enterprise capital management activities to divide the specific links of team construction according to the financing, investment and management of teachers' human capital. From the perspective of human capital, the construction of university teachers for new engineering is faced with the dilemma of team preparation, growth investment and performance.

3.1 Predicament of teacher team construction

In view of the needs of talent cultivation and scientific and technological innovation under the background of new engineering, it is an inevitable requirement for universities to build a team of teachers with strong business ability and high comprehensive quality to achieve connotative development. Because teachers who meet the needs of new engineering construction should have multiple abilities and qualities in different dimensions, including professional knowledge, engineering skills, practical experience, national feelings, innovation ability, integration ability and healthy physique, the composition of teachers' human capital is characterized by diversity. At the same time, teachers who meet the needs of human capital and are competent for the training of new engineering talents can have different sources, including universities, research institutes, industry enterprises, experts and scholars, government departments, and social groups. The sources of human capital are rich. Teachers' human capital for new engineering is the ability and quality formed by investment. It is not static, but with the continuous change of education and training, work experience and personal efforts, human capital shows dynamic characteristics.

In the preparation and construction of teachers in the context of new engineering, due to the lack of sufficient attention to the characteristics of human capital, the following three aspects have emerged. First, the contradiction between diversity of human capital and one-sidedness of talent orientation. When introducing teachers, universities pay too much attention to academic papers, science and technology awards, talent titles, job titles and other contents, but ignore other abilities and qualities of talents. Although these contents can represent some abilities of teachers to a certain extent, they cannot fully meet the human capital needs of new engineering teachers. Strong theoretical ability and weak practical ability, high imitation level and poor original innovation, and extensive knowledge and moral corruption are common. Teachers' comprehensive quality and ability have not been paid enough attention. Second, the contradiction between the richness of human capital sources and the single channel of construction. The main sources of supplementary teachers in universities include current masters, doctors, and post-doctors. Most of the growth trajectories of new teachers are from colleges or universities to universities, lacking the experience of diversified job training. Such teachers will be lacking in practical ability, engineering thinking, innovation and entrepreneurship ability. However, the supplement of teachers from other channels is not smooth due to the one-sided orientation of talent introduction and dogmatic employment mechanism. A large number of excellent potential teachers are excluded from the teaching staff, which is not conducive to the cultivation of new engineering talents. Third, the contradiction between the dynamic change of human capital and the short-sightedness of talent evaluation. When selecting talents in universities, it is often only concerned about the current human capital of talents, including scientific research

projects, graduate colleges and universities, academic papers and other direct embodiments, but it is easy to ignore the characteristics of dynamic changes of human capital. It is not enough to pay attention to the indirect embodiment of talent growth potential, research direction forward-looking, team complementary advantages, and lack of long-term and comprehensive evaluation of talents, which is easy to lead to the loss of excellent talents. Due to the above problems, there are common deficiencies in the teaching staff prepared by such standards, which also explains why university teachers cannot meet the needs of talent training under the background of new engineering construction from the perspective of talent introduction source. These problems have also jointly caused difficulties in the preparation of teachers for new engineering.

3.2 Teachers' growth investment dilemma

Teachers' human capital owned by universities is the core resource for them to improve school-running level and reflect school-running value under the background of new engineering construction. Since human capital is formed through investment and has the characteristics of dynamic change, most universities hope to invest in human capital for teachers by means of education promotion, overseas studies, special training, and continuing education, so as to improve their core resources. Some characteristics of human capital will have an important impact on the effect of human capital investment. In the context of the construction of new engineering, the scientific and technological revolution and industrial revolution have accelerated, the cycle of knowledge updating has shortened, and new interdisciplinary fields have emerged. New theoretical and technical methods have been iterative frequently. The knowledge and skills that teachers have mastered through human capital investment have gradually lagged behind over time, and human capital investment has shown obvious timeliness. At the same time, human capital is the capital existing in human beings. All kinds of investment methods need the cooperation of human capital owners, and they need their time and energy. Human capital investment shows personal dependence. In addition, human capital is an important resource that can bring benefits to owners. Increasing the stock of human capital through investment can bring more benefits to owners, and human capital shows the characteristics of capital.

In the investment link of teacher growth in the context of new engineering, the problems caused by ignoring the characteristics of human capital are mainly manifested in the following three aspects. First, the contradiction between human capital timeliness and investment stage. Institutions of higher learning investment in teachers' education and training usually occurs in the short term of entry, title appraisal, promotion and other stages, as well as temporary supplementary investment in the shortage of human capital, but lack of systematic, long-term, comprehensive human capital investment planning is common. The scientific and technological revolution in the context of new engineering

is booming. The depreciation of teacher human capital is accelerating, and periodic investment is difficult to make up for the continuous loss, resulting in the continuous shortage of teacher human capital for new engineering. Second, the contradiction between human capital dependence and investment selectivity. When universities invest in teachers' human capital, they tend to formulate unified investment standards and programs from the perspective of easy operation and cost saving. But this human capital investment does not take into account the teachers' personal strengths, interests, acceptance and other factors, did not really achieve teacher-centered. The lack of personalized human capital investment programs makes teachers' investment less selective and unacceptable, thus affecting teachers' cooperation in human capital investment. Third, the capital of human capital and investment income contradiction. The opportunity cost of human capital investment includes capital, time and energy, and only when the expected return is greater than the opportunity cost can investment behavior occur. Under the background of new engineering, teachers need to master the forefront, the most complex and the most critical science and technology, and need long-term, high-quality and high-intensity human capital investment. However, the existing expected investment income is not necessarily able to support the investment opportunity cost, which weakens the investment motivation and affects the investment behavior of human capital from the capital attribute. Compared with middle-aged and elderly teachers, young teachers can accumulate human capital stock through investment, which can have longer capital return cycle, obtain more expected benefits, and produce stronger investment behavior motivation. This also explains why the effect of education and training of young teachers is generally better than that of middle-aged and elderly teachers. These problems jointly cause the investment dilemma of teacher growth for new engineering.

3.3 Teachers' performance dilemma

Teachers' human capital is the key basis for teachers to perform their functions and play a role, and the effectiveness of human capital is not equivalent to the stock of human capital, which will be affected by the way of human capital operation. Under the background of the construction of new engineering, some characteristics of human capital are contradictory to some operating modes, thus affecting the actual efficiency of human capital. University teachers for the construction of new engineering need to have a variety of abilities and qualities, rich in human capital. Each teacher's mastery of all kinds of knowledge and skills, the level of all kinds of quality, all kinds of character concepts are not the same, human capital presents heterogeneity characteristics. At the same time, teachers' human capital plays a role through teachers' subject. Teachers' emotional will, values, and ways of thinking will all affect the effect of human capital, and human capital presents the characteristics of initiative. In addition, human capital exists in teachers, which has no specific form, cannot be directly

observed, and is difficult to be fully measured. Human capital shows the characteristics of concealment.

In the context of new engineering, the problems caused by ignoring the characteristics of human capital are mainly manifested in the following three aspects. First, the contradiction between the heterogeneity of human capital and the comprehensiveness of talent training. In order to actively respond to the needs of new engineering construction, universities urgently need to cultivate a large number of excellent engineering science and technology talents with high comprehensive quality and strong engineering ability, which requires teachers to have various qualities and abilities. In meeting the basic conditions of employment, any teacher has expertise and shortcomings, difficult to do everything. Relying on a small number of professional teachers to complete all aspects of talent training is bound to get twice the result with half the effort, which can not give full play to the human capital efficiency of teachers. Second, the contradiction between human capital initiative and incentive mechanism guidance. The function of teachers' human capital depends on teachers' subjective initiative. Teachers with dedication and full spirit can give full play to their own human capital efficiency, while teachers who are not enterprising and responsible cannot achieve the expected human capital efficiency. The key lies in the guiding role of incentive mechanism. Under the background of new engineering construction, the contribution of high-quality teachers' human capital in talent training is increasing, while the traditional allocation, reward, promotion and other mechanisms have not played a good incentive role, resulting in some teachers' low morale and dissatisfaction, which directly affects the effectiveness of human capital. Third, the contradiction between the concealment of human capital and the limitation of external evaluation. Teachers' career development is influenced by the evaluation of schools, colleagues, students and other external subjects. Objective and comprehensive evaluation can help teachers locate accurately, provide teachers with appropriate career development platform, and better play the effectiveness of human capital. However, due to the concealment of human capital, the quality and ability of some teachers are not accurately evaluated, resulting in the mismatch between ability and position, the mismatch between quality and responsibility, and the failure to make full use of talents, which greatly reduces the effectiveness of human capital. These problems have jointly caused the dilemma of teacher effectiveness for new engineering.

4. THE CONSTRUCTION PATH OF TEACHERS FOR NEW ENGINEERING

Human capital theory is an effective method to study the internal motivation of subject behavior. It is a reasonable choice to face up to and apply the human capital characteristics of teachers under the background of new engineering and explore the

corresponding mechanism and countermeasures to improve the overall level of teachers. Broadening the vision of talent introduction, improving the level of human capital financing, improving the training program, ensuring the effectiveness of human capital investment, improving the use mechanism and improving the efficiency of human capital operation are effective countermeasures to solve the dilemma of teacher team construction under the background of new engineering.

4.1 Broaden the vision of talent introduction and improve the level of human capital financing

Human capital is the key foundation for university teachers to perform their job functions, realize their own value and serve the development of the school. Improving the overall level of human capital of teachers under the background of new engineering is an important guarantee for universities to serve the national strategy and promote the high-quality development of the cause. The improvement of the overall level of teachers should start with the source of talent introduction for the formation of teachers. First, adhere to the objective and comprehensive talent introduction orientation, resolutely break the "five only," and strive to bring excellent compound talents who can be competent for the cultivation of new engineering talents into the teaching staff. Universities should investigate the composition of teachers' human capital in all aspects, in addition to scientific research papers, job titles, talent titles and other easy quantitative content, but also consider the ideological and moral quality of talents, learning and working experience, communication and expression ability. At the same time, in view of the current shortage of engineering ability in the teaching staff for new engineering, universities should pay special attention to the introduction of compound scarce talents with certain engineering skills and practical experience. Second, broaden the channels of talent introduction, enrich the form of talent introduction, and make full use of all kinds of high-quality human capital to help the construction of teachers. The traditional channels and models of talent introduction have been unable to meet the needs of diversified and high-quality teachers to adapt to the construction of new engineering. Universities urgently need to tap potential resources from social human capital, and introduce high-quality human capital in industrial enterprises, government departments, social organizations and other institutions into teachers, including high-skilled talents of enterprises, entrepreneurial entrepreneurs, industry associations, policy makers and so on. At the same time, establish and improve a more flexible talent introduction mechanism, through the establishment of part-time professors, industry professors, lecture professors and other positions, take the co-construction of entrepreneurial studios, open famous teacher elective courses, hold frontier lectures and other ways, so that high-quality human capital out of the flow limit, so as to prepare for the construction of high-level teachers play a good complementary role. Third, pay attention to talent growth potential, overcome the evaluation of short-sighted thinking,

with a long-term strategic perspective to select appropriate teachers. Teachers' human capital is in a dynamic change, and its role runs through the whole career, which has a long-term and profound impact on the construction of new engineering in universities. The selection of talents in universities should not only consider the current explicit conditions, but also consider the hidden conditions of talents from the perspective of development, such as forward-looking discipline layout, originality of scientific research, personal ability growth and complementary team advantages. Combined with the development strategy of school cause and the goal of teachers' team construction, suitable teachers are introduced.

4.2 Improving training programs and ensuring the effectiveness of human capital investment

Universities should set up teachers with moderate scale and reasonable structure on demand, that is, they have a certain level of initial human capital stock, and the human capital stock of teachers can be added through further education, education, training and other investment methods. Therefore, in the construction of new engineering, according to the characteristics of human capital, universities can further improve the overall level of teachers by continuously improving teacher training programs and ensuring the effectiveness of human capital investment. First of all, it is necessary to make up for the rapid depreciation of human capital by continuous human capital investment, enhance teachers' learning awareness, establish the concept of lifelong learning, and actively adapt to the needs of teachers' team construction in the context of new engineering. At the same time, the content of human capital investment such as education and training should be updated in a timely manner, closely around the frontier areas of new engineering, strengthen interdisciplinary integration, focus on new engineering areas, and help teachers master the latest theoretical knowledge and practical methods. Universities should give up the tendency of utilitarian, short-term and superficial training, guide teachers to improve themselves, and comprehensively improve the effectiveness of human capital investment from the perspective of long-term investment time limit and long-term investment effect. Secondly, adhere to teacher-centered, give teachers to participate in education and training more independent choice, develop personalized human capital investment programs. In terms of investment content, in view of the differences in experience, memory and understanding of teachers of different ages and the rich connotation of human capital, combined with different career development orientation, provide teachers with diversified investment content for selection. In terms of investment forms, various forms, such as the combination of online learning and offline communication, the combination of collective learning and individual self-study, and the combination of scientific research and enterprise cooperation, are adopted to continuously optimize the human capital investment scheme of teachers. Universities should adopt the investment

model that varies from person to person and adapts to the time to promote the active cooperation of teachers. Third, improve human capital investment income expectation, strengthen teachers' human capital investment motivation, and positively guide human capital investment behavior. Teachers facing new engineering need long-term investment, high-intensity work, high-quality investment to maintain a high level of human capital. The internal driving force of capital profit-seeking objectively requires a high expected return to maintain the continuous stability of this investment behavior. By adopting the incentive distribution system related to the contribution of human capital, improving the treatment of high-quality talents, establishing a typical example benchmark, and increasing the investment of young teachers, human capital investment behavior can be guided, and the effectiveness of human capital investment can be improved from the internal management.

4.3 Improving the use mechanism and enhancing the operational efficiency of human capital

Under the background of new engineering, university teachers can have a high level of human capital stock on the basis of optimizing the source and strengthening training. But the effectiveness of human capital is not equal to the stock of capital, but based on the stock of human capital, affected by the use mechanism. Therefore, universities should combine the characteristics of human capital and continuously improve the talent use mechanism to better play the human capital efficiency of teachers. First, universities need to strengthen the construction of teachers' team for new engineering by employing talents and division of labor. There are differences in the composition of each teachers' human capital, both their respective strengths and corresponding weaknesses. The strengths of each teacher are used for the construction of new engineering, while the weaknesses are managed to use the strengths of other teachers to compensate. With the help of team strength, the problem of diversified needs of talent training can be effectively solved. Second, it is important to improve the incentive mechanism, pay attention to policy guidance, and give full play to the subjective initiative of teachers. According to the needs of teachers' personal development, universities should establish and perfect incentive mechanism in reward distribution, job title evaluation, job promotion and further study opportunities. At the same time of material incentives, teachers are guided to pursue a higher level of self-worth realization by creating a campus atmosphere of respecting teachers and teaching, promoting advanced figures and deeds, and promoting the spirit of loving work and dedication. Continuously improve teachers' sense of honor, happiness and acquisition, mobilize the enthusiasm of the majority of teachers, so as to improve the efficiency of human capital. Third, it is the responsibility of universities to study of teachers deeply, and actively create a good environment for teachers to do their best. Through students' evaluation of teaching, colleagues' evaluation, daily performance, work performance and other ways

to examine teachers' human capital in multi-dimensional, fair evaluation of teachers' ability, quality and contribution. Combined with teachers' human capital composition, occupation orientation, job demand and other factors, in accordance with the principle of personnel post, to provide teachers with appropriate career development platform and good personal growth opportunities. Universities should gradually form an entrepreneurial environment for cadres to make the best use of their talents, and give full play to the human capital efficiency of teachers for new engineering.

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