

Original Research Article

The Marginal Contribution of Heckman's Non Cognitive Ability Research to China's New Human Capital and Education System

Lingxuan Fang^{1,2,*}, Xiang Wei³

1 Organization Department of the Party Committee of Lanzhou University of resources and environment, Lanzhou 730000, Email: 94200489@qq.com

2 Lyceum of Philippines University Batangas, Door of Philosophy in Managent

3 School of Business, University of Chinese Academy of Social Sciences, Beijing 102488; Institute of Financial Strategy, Chinese Academy of Social Sciences, Beijing 100006

Abstract: The theory of human capital originated from economic research. In the 1960s, American economists Schultz and Becker founded the theory of human capital, opening up new ideas about human production capacity. This theory believes that human capital is the capital reflected in the human body, which is the sum of expenses for education, vocational training, and the opportunity cost of receiving education for producers. It is manifested as the total stock of various production knowledge, labor and management skills, and health qualities contained in the human body. The theory of the education system in this article is crucial. The contribution of this study is to use economic analysis tools to propose the construction of an education oriented approach, providing a new path analysis for how to shape new human capital in China's national conditions, and contributing new elements to the construction of a Chinese style human capital system.

Keywords: Non cognitive abilities; Personality and cognitive testing; New human capital; Educational economic trade-offs; Educational human capital

1. The Connotation of the Heckman Curve

As is well known, the Heckman curve is an individual's life cycle with a given ability, assuming that each age group implements the same investment, "then under the same other conditions, the return rate of early human capital is always higher than that of late human capital" (Carneiro&Heckman, 2003). The reasons for this are: firstly, early investments have a longer harvest period; furthermore, due to the "skill agglomeration effect" of human capital accumulation, early investment either improves the output efficiency of later human capital or reduces the cost of later investment (Carneiro&Heckman, 2003). In addition, from Heckman's subsequent research and related advances in brain science, we can also understand an important neurological mechanism: due to the different plasticity of different types of abilities at different stages of the life cycle, the average investment time for individual human capital accumulation is later, and the return is lower (Heckman, 2011).

1.1. Early Education

The educational goal is the concretization of educational objectives, with hierarchy, and the ultimate goal is the fundamental goal, usually summarized as educational objectives. Due to the fact that "education and training are the most important investments in human capital" (Becker, 1993), policy initiatives to increase individual human capital accumulation almost always involve extending the duration of education. However, in the direction of extending the length of education, the theory of human capital has long lacked in-depth research and judgment. Many scholars have repeatedly talked about the need to extend to higher-level education, and

policy recommendations to narrow individual disparities are also revolving around short-term remedial measures, without understanding the formation of skills and abilities from the perspective of the entire life cycle. In fact, the book “Inequality in the United States: The Role of Human Capital Policy”, which includes the report “Human Capital Policy,” is a collection of articles with a policy debate nature. It includes two research reports that both agree on increasing investment in education and extending the length of education, but differ in many aspects, addressing the growing skill gap and labor income inequality in the US economy. Heckman's policy direction and recommendations are “closer to a revolution” (Checchi, 2005), which provide a theoretical basis for government investment decisions in education to tilt towards the stage of basic education from the perspective of public funding performance.

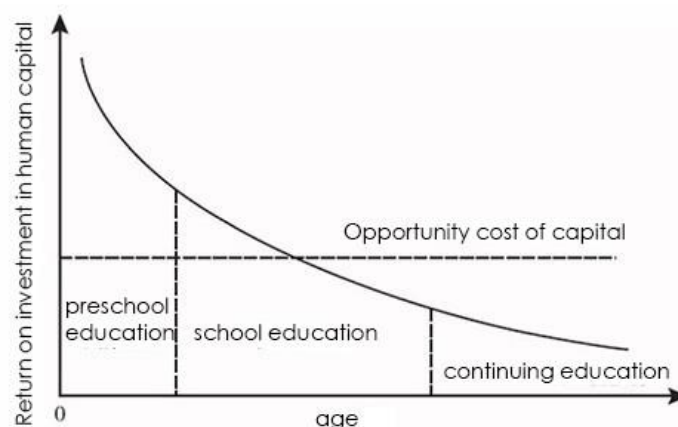


Figure 1. Heckman curve.

In order to avoid being misinterpreted or even taken to extremes, the Heckman team innovatively proposed the concepts of “self-enrichment” and “multi period complementarity” in a working paper titled “Evidence Interpretation of Life Cycle Skill Formation” submitted to the Institute of Labor Research (IZA) in Bonn, Germany in 2005. Through them, the Heckman team further improved the dynamic theoretical framework of “individual skill formation”. In short, the “self-enrichment” of human capital investment means that “the accumulation of skills in the early stages of the life cycle will automatically add to the accumulation of skills in subsequent stages”; The “multi-period complementarity” of human capital investment means that “without later investment as a supplement, early investment will also be difficult to reap” (Cunha, et al., 2005). Afterwards, including the literature published in the journal Science (Heckman, 2006), Heckman repeatedly reiterated that maintaining a high level of investment after high-quality early interventions is necessary to ensure the benefits of these projects.

1.2. Establishment of the concept of multi-period complementarity and the concepts of “sensitive period” and “critical period”

Obviously, the Heckman curve cannot be understood one-sidedly as increasing early investment will result in higher returns. We also need to pay attention to an important prerequisite beyond the minimalist form – “multi-period complementarity”. Increasing investment in preschool education is a necessary condition for obtaining higher returns in the later stage, and without high-quality preschool education, relying solely on remedial measures for backward individuals in adulthood may lead to a situation where the cost of remedial measures may even be almost impossible to achieve. This is actually a reflection of Heckman's particular focus on dynamics and long-term mechanism design in human capital thinking – “In the long run, the skill level of

American workers has significantly improved, especially those who have not attended university, all of whom benefit from early educational system arrangements” (Heckman, 2000).

If we say that 'self-enrichment' draws on the Matthew effect of learning proposed by Western educational scholars (Stanovich, 1986), so “multi period complementarity” is an important innovation in the concept of human capital accumulation. This concept breaks the previous paradigm represented by Becker's theory that the early stages of the life cycle are too crude, and thus breaks the misconception that policy advice has often been limited to providing some individual financing convenience in the years before employment or college (Carneiro et al., 2003). The concepts of “sensitive period” and “critical period” can be naturally derived from the “complementarity of multiple periods”. The “sensitive period” refers to the stage where a certain type of skill output is higher compared to other stages in the life cycle, while the “critical period” refers to a special stage where a certain type of skill (or ability) output can only be obtained at a certain stage (Cunha et al., 2005). The establishment of the concept of multi-period complementarity and the concepts of “sensitive period” and “critical period” has built an interdisciplinary bridge for the further adoption of research achievements in education, psychology, and neuroscience in human capital theory.

2. The Limits of Cognition: Standardized Exams

Education exams are national in contemporary American society, have universality, and are also the root of deep-seated contradictions. As revealed around the theme of “not letting a child fall behind”, the opinions of experts in standardized exams are different and strongly divergent. The 2001 US Education Act, as stated by the New York Times, “ushered in an era of widely reviled and high-risk standardized exams” (Stanhall, 2015). One side of the conflict hopes that the federal government will have more control over how to address the achievement gap caused by race and class, while the other side hopes that states will propose improvement plans based on local needs. The standardized testing discussed measures what truly matters in determining life opportunities. This belief creates a self-reinforcing cycle. Do you want to know which university has the smartest children? According to Forbes data, California Institute of Technology has the highest average math exam score. Bold to say, “The standardized SAT and ACT exams have broken the smoke and chaos of extracurricular activities and mirrors generated by different high school grading plans” (Schifflin, 2014). The US news rankings are similar in terms of reliance on standardized exams and assumptions about their meaning, as revised. Although the rankings may be high, millions of anxious Americans will also follow suit. Given the long history and continuous concretization of education exams in the United States, the current situation may be inevitable. The idea that standardized testing can evaluate cognitive achievement and potential intelligence can be traced back at least to Francis Galton. In the first 25 years of the 20th century, with the development of the US Army's intelligence testing, the belief in the power of standardized testing to evaluate cognitive skills in currency circulation increased its control over the interpretation of American education and social stratification. The most famous is clearly stated by Herrnstein and Murray in “The Bell Curve: Intelligence and Class Structure in American Life” (1994). In their view, generalized intelligence quotient (IQ) can be accurately measured through standardized tests and is largely heritable. The hierarchical system led by cognitive elites is seen as the natural order of things, but IQ tests and achievement tests are different, and the results prove that neither can measure the important qualities that determine life success. Entering “The Myth of Achievement Testing: The Role of GED and Personality in American Life” (2014), this is a powerful indictment of widely held assumptions and practices in the American education system. James J. Heckman used decades of empirical research to analyze the tests

surrounding GED and demonstrate the importance of personality. If this personality can be taught, it stimulates the idea of non-cognitive skills. Therefore, cognition and personality are assumed to be independent structures, and according to the proposed viewpoint, the establishment of personality requires decision-makers to refocus, relying solely on performance tests is not wise and dangerous.

3. The importance of non-cognitive skills

According to evaluation research, taking seriously the role of personality in educational achievement and the advantages and implications of explaining the outcomes of later life, it is concluded that Humphreys and Kautz (hereinafter referred to as HHK) fundamentally explain the importance of non-cognition over cognitive skills. In particular, it is believed that antisocial behavior during childhood triggers a cumulative process of adversity, which allows continuity to continue through interaction with social control institutions - families, schools, peers, communities, and the state. This stance is consistent with HHK's dynamic model, as HHK's human skill development theory and policy intervention theory will benefit from more direct integration of these factors. It also considered how people's different social reactions to personality and the different impacts of personality are separated from individual tendencies or behaviors, and distinguished between the ability to control oneself and the desire to do so: a person can choose to exercise a skill or not. Considering the macro structural changes reflected in group differentiation, which raises further questions about the personality and policies of American society itself, "non-cognitive skills" are particularly important. Heckman and colleagues' basic argument is based on the structural validity and causal power of non-cognitive skills or personalities. Therefore, an outsider's perspective on this proposition may help advance a truly interdisciplinary interpretation of socio-economic achievements and an understanding of personality sources.

4. Role Definition

4.1. Personality

Webster's Dictionary defines personality as a person's unique spiritual and moral qualities. The common usage tends to follow this normative definition, and in the American context, personality is often regarded as an individual's property. This is especially true when we consider Aristotle's virtues and moral qualities. Defects in personal character can easily become a reason for condemnation, and often result in severe punishment. Cognitive skills are often seen as an attribute of individuals and a key to success in life. They go to extremes in theory and public policy, endowing intellectual differences with genetic endowments.

4.2. Cognitive Testing

Non cognitive skills are a key determinant of life achievement and are more important than local intelligence captured by cognitive tests. HHK believes that cognitive skills are quite important - children must naturally learn how to read, write, and do mathematics. But according to HHK, the excessive reliance of the United States on cognitive testing is dangerous and has led to poor policies by GED. GED holders perform poorly compared to high school graduates precisely due to insufficient cognitive skills. They believe that what GED holders miss in high school, and what many children miss in their growth process, is the indoctrination of character. Therefore, the scientific conclusions and policy authorization for HHK are clear and go beyond getting rid of GED. Personality is a skill, not a trait, that can be enhanced. Additionally, although personality is relatively stable at any age, "skills are not fixed throughout the entire life cycle." Both cognitive and personality skills can be

changed (Robert J. Sampson *, 2016). Firstly, prospective studies have revealed more heterogeneity and behavioral changes than expected by the “Big Five” or self-control school, and there is evidence that turning points can moderately alter the trajectory of accumulated adversity. For example, HHK recognizes the importance of personality training for adolescents when childhood is compromised, but it is never too late in the process of life. Adhering to the “now or forever” perspective of intervention in young children, neglecting history and the personality of parents of troubled children. Of course, this is more expensive, but we have no choice but to take adult life seriously to avoid being eliminated by society. These adults are usually also parents, and they will play a role in interventions targeting their children. Therefore, the design of personality intervention is actually social support, which is necessary throughout the entire life process, even if the return is lower, the cost is higher than during childhood. Therefore, personality is not just a skill, in a sense, it is a personal characteristic - it is deeply rooted in the structural conditions of existence. HHK also emphasizes that personality and cognition are shaped by the social environment - the ecological economics and psychology of personality skills. Therefore, from family and school to social response, social background, social change, and ultimately social level, policies that focus on social background logically align with HHK's call for attention to the suprapersonal characteristics of schools.

4.3. Social Organization of Schools

John Dewey focuses on the social organization of schools, emphasizing that character and moral education cannot be simplified into personalized training. By evaluating Dewey's personality building theory, it is concluded that personality education programs are ineffective and reflect a moral approach inspired by traits; Personality is considered a structure of virtue and vice. In contrast, Dewey's theory of moral education proposes a dynamic concept of morality. Personality encompasses all the desires and habits that influence human behavior for all purposes; having virtue means becoming something that a person can become by interacting with others. In order to promote moral development, Dewey hoped that schools would provide opportunities for cooperation, self-guidance, and leadership, rather than obedience, passivity, and blind obedience to authority (Pietering 1977:179).

In this sense, schools are considered the main social background that supports character building, rather than just conformity. The core of Dewey's personality lies in its formation in a mutually supportive and interactive social environment. From this perspective, an education system that follows dogma or structural inequality may be interpreted as a warning signal rather than a sign of progress, and neither cognitive nor non cognitive skills can guarantee moral quality.

Dewey's concern for the education and social organization of students' personalities in schools is correct, and so is HHK and others (such as Arum 2003; Bowles, Gintis, and Osborne 2001; Jenks 1979; Lawdenbush and Ashman 2015) regarding the unequal rights of personality, school social organization, and individual outcomes. But what this article explains is that personality does not represent non cognitive skills. More importantly, we should focus on social organization, social personality responses, and inequality in the community environment. In fact, American social policies are sometimes forward-looking, but there is also a tendency towards impulsiveness, shortsightedness, and immediate satisfaction that never goes far from the surface.

Experience has shown that the self-control level of American teenagers is significantly lower than that of Nordic societies such as Sweden, Norway, and Denmark (Bozkovar et al., 2015). Is this due to the aggregation

of personality defects at the individual level, or is it due to the lack of early childhood soft skills training in the United States? Undoubtedly, factors such as violence, imprisonment, concentrated adversity, racial segregation, environmental degradation, and many other environmental characteristics are largely influenced by unfair public policies.

4.4. Social Control

This is a failure of social control, conceptualized as the ability of the social structure to achieve its diverse citizens' common interests and support the desired long-term goals. Social control should not be equated with suppression or forced obedience. On the contrary, in the pragmatic sociology (Dewey) tradition, social control refers to the ability of a social unit to organize itself based on expected principles and mutual values - to achieve collective goals, rather than mandatory goals (Yanowitz 1991; Sampson, Laudenbush, and Earl 1997). Therefore, our society's ability to achieve character and equality is at risk, and American society will benefit from character building towards a more balanced integration of self and social control policies.

5. The Generation of New Human Capital

With the continuous deepening of research on human capital theory, the calculation of human capital is constantly refined and accurate, and the improvement of statistical tools and the rapid enrichment and improvement of various databases, Bert Consulting believes that the limitations of methods such as education years method and education index method are becoming increasingly prominent, mainly manifested in: firstly, individuals with the same education duration may have vastly different human capital due to external environment and individual differences; Secondly, formal academic education is a static concept that cannot reflect post academic education; Thirdly, human capital formed in areas such as "learning by doing" cannot be counted. In response to the aforementioned shortcomings, in recent years, some studies have focused on measuring human capital by calculating individual skill levels. The World Bank divides skills into cognitive skills, non-cognitive skills, and vocational skills. The level of individual labor ability depends on the comprehensive application of the three sets. The skill testing algorithm is a very refined calculation, and the measurement indicators are currently not completely unified.

Firstly, Walsh (1935) defined human capital as the technology and knowledge acquired by workers through learning and labor. Human capital is an important factor in economic development. Schultz (1961), the founder of human capital theory, first defined human capital from a macro perspective, believing that human capital is the sum of factors such as the health level, talent, and specialized knowledge obtained through learning of the labor force itself. It is a comprehensive combination of labor quality and quantity, and an important factor in promoting the rapid development of human society and economy. Becker (1964) studied the theory of human capital and human capital investment from a micro perspective, further expanding the scope of human resources and proposing that the transfer of knowledge, skills, health, time, and labor value should be included in human resources.

In the composition of human capital, it is also necessary to consider the relevant concepts of human capital, and define human resources from three aspects: education level, health status, professional skills, and age. Katherine and Coleman (2006) divided human resources into three levels: primary, intermediate, and advanced based on their education level. Odaviano (2003) creatively considered both technological and non-technical human capital. From a value perspective, Hu Yongyong (2004) analyzed the human resources of labor-intensive, capital intensive, and technology intensive enterprises in China.

Capital is divided into innovative and ordinary types. Hilt and Bruno (2009) summarized the concept of

effective human capital from the perspective of population age structure. From the perspective of human capital investment, Zhang Guiwen (2014) can classify it into three categories: educational level, technological level, medical and health care, vocational training, and labor mobility. In order to better grasp the significant changes in the labor stock at various stages of social development, Liu Zhiyong (2018) elaborated on the concept of advanced human capital structure, by adjusting and optimizing the human capital structure, achieving coordinated development of various human capital, gradually reducing the proportion of primary human capital, and gradually increasing the proportion of advanced human capital to meet the needs of economic development for high-quality human capital. Although the concept of “advanced” can reflect the changes in the proportion of various types of human capital, it does not reflect the coordination and synergy between various levels of human capital. In this context, the basic idea of the evolution of enterprise human capital structure is to adjust and optimize it from low to high levels, so that it can quickly develop towards high levels and ensure its effective matching. Promote the coordinated development of various types of human capital in various stages of economic and social development.

The “New Human Capital Theory” is largely inspired by North's “Institutional Change Theory”. The academic discourse of North and his followers rarely appears in textbooks and tutorials on educational economics. North was awarded the Nobel Prize in Economics in 1993 for establishing a “theory of institutional change” that includes property rights theory, state theory, and ideological theory. North's contribution is reminiscent of his neglect of criticism of institutions and economic structures in neoclassical economics, which is equally applicable to criticizing the fundamental flaws of human capital theory as a tool for analyzing educational issues. Using economic analysis tools to provide a theory on the system and institutional changes of education is also crucial, but it cannot or should not be expected that mainstream economists will prioritize this research issue. Relevant efforts must be made by educational economists. The “New Human Capital Theory” emerged from this vague consciousness.

6. Education and Human Capital

Education is one of the most important determinants of worker productivity. By studying longer in school (which often means delaying work), people can increase their expected annual income. On average, high school graduates earn more than those without a high school diploma, those who have attended university earn more than those with only a high school diploma, and those with a university degree earn more than those who have attended university but have not graduated. A student's income during their school years is low, but they can expect to receive higher income in the future. In addition, working hard and giving up leisure time in school may lead to better grades and skills, which may also lead to higher wages in the future. Therefore, students face a trade-off between today's leisure and income, and future income and consumption.

There are obvious costs to studying in university for a year - tuition, accommodation, etc., but there are also opportunity costs, specifically, income that can be earned from a job. These opportunity costs, like directly paid tuition fees, are the cost of attending school. Similar to the physical capital investment of enterprises in factories and machinery, economists claim that investment in education generates human capital. The development of human capital is composed of formal school learning, on-the-job training, parents' other investments in time and money for their children, individuals' investments in themselves, and employers' investments in employees. The value of accumulated human capital in the United States is greater than the value of accumulated physical capital, with two-thirds to three-quarters of all capital being human capital. This type of investment involves both public and private sector investment. Out of the \$1 trillion in annual education investment in the United States, local, state, and federal governments have invested approximately 1/4, with over 20% of primary and secondary

education spending being the largest among local and state governments. Education spending has grown the fastest in the past 50 years, as shown in Table 1.

Table 1. Years of Education by Age Group.

age group(2003)	Percentage without high school education (%)	Percentage of individuals with a high school degree but no bachelor's degree (%)	Percentage of individuals with bachelor's degree or above (%)
25~34	13	57	30
35~44	12	59	29
45~54	11	59	30
55~64	15	58	27
65~74	25	56	1
75 years old and above	33	52	15

Data source: Statistical Abstract of the United States, 2004. (www.census.gov/prod/2004pubs/04statab/educ.pdf).

The chart shows that more than 30% of the population aged 65 and above do not have a high school education; Among the population aged 25-44, only 1/8 do not have a high school education. Similarly, the percentage of people aged 25-44 with a bachelor's degree or above is 1.5 times higher than those aged 65 and above.

7. Education and Economic Tradeoffs

The production possibility curve can be used to illustrate how decisions on human capital investment are made. For this reason, we divide a person's life into two periods: the “youth period” and the subsequent “work period”. Figure 2 depicts the relationship between Everett's “youth” consumption and subsequent “work” consumption. As this person abandons consumption during their youth, studying longer in school will increase their expected future consumption, as they can expect their income to increase. The curve in the figure is drawn in an arc shape. It shows diminishing returns: spending more on education today (reducing consumption) will increase future income, but the increased returns per unit of investment will be smaller and smaller.

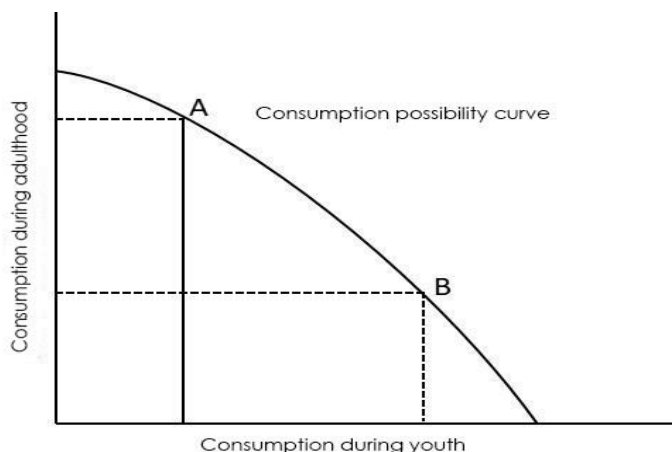


Figure 2. The relationship between Everett's “youth” consumption and subsequent “work” consumption.

Point A indicates that Everett devoted all four years of college time to studying. Before graduation (during his youth), his income was small, but he had a higher income thereafter. Point B indicates the situation of leaving school after graduating from high school. When he did this, Everett had a relatively high income during his youth, but a lower income thereafter. The point between points A and B indicates that Everett left school after only one or two years of college. The choice between education and current consumption and future consumption, represented by point A, is to reduce consumption in the current period to obtain better education, with higher future consumption. The choice represented by point B is to have higher current consumption and less education, resulting in lower future consumption levels.

8. The Fit Index of Educational Human Capital

In structural equations, when we talk about fit, it actually refers to how to try to change the size of each parameter value, so that the fitted covariance matrix is closer to the sample covariance matrix, that is, Δ_{est} is smaller. Generally, we use the fit function F to measure the size of Δ_{est} . The smaller the value, the better the fit between the two matrices. According to different estimation methods, the general method we use is maximum likelihood (ML), and the formula for calculating the minimum value of the fitting function F is:

$$f_{ML} = \log|\Sigma^{(g)}| + \text{tr}(s^{(g)}\Sigma^{(g-1)}) - \log|S^{(g)}| - p^{(g)} + \frac{1}{2}(\bar{x}^{(g)} - \mu^{(g)})' \Sigma^{(g-1)} (\bar{x}^{(g)} - \mu^{(g)}) \quad (1)$$

The most basic measurement index of the overall fitting is χ^2 , whose formula is:

$$\chi^2 = (N-1)F \quad (2)$$

Among them, N is the sample size, and F is the minimum value of the fitting function.

Along with Party A, we also need to consider both the degree of freedom and the p -value. Among the many different fitting indices, χ^2 is one of the few with known distributions. In addition, there is the root mean square error of approximation (RMSEA) fitting index. Due to the known distribution, we can detect whether χ^2 , i.e. Δ_{est} , is significant. Compared to each χ^2 and its degree of freedom (DF) value, we can find that the smaller the p -value, the larger the p -value, indicating that the difference between the fitted covariance matrix and the sample covariance matrix is less significant, and the initially assumed model will not be overturned; On the contrary, the larger χ^2 , the smaller p -value, indicating a significant difference between the fitted covariance matrix and the sample covariance matrix. At this point, our initial hypothesis of the model is about to be overturned.

However, the value of χ^2 is quite sensitive to the number of samples. The larger the sample, the more likely it is to become significant, making the hypothetical model more susceptible to rejection. In fact, we can also find from the formula that the χ^2 value is highly dependent on the sample size, as the calculation is based on multiplying the sample number by the F value. Usually, in structural equation experiments, we need a large sample size, which can lead to rejection of the model even if the difference between the fitted covariance matrix and the sample covariance matrix is not significant. This contradiction also reasonably explains why scholars are constantly searching for more suitable fitting indices. Nowadays, most software supports over 30 fitting indices simultaneously. Below, we will briefly introduce several commonly used fitting indices to you:

One is root mean square error of approximation (RMSEA).

$$\text{Estimated RMSEA} = \sqrt{\frac{x^2}{(N-1)(DF-1)}} \quad (3)$$

As mentioned above, non-cognitive abilities refer to the ability to motivate oneself, look to the future, believe in oneself, trust others, control emotions, adapt to society, and have a high sense of happiness in life. And this non cognitive ability coincides with EQ (commonly referred to as EQ or emotional quotient in contrast to IQ). Psychological research shows that IQ has a high heritability, which means it is largely determined by genetics. Therefore, it is difficult to improve IQ through acquired factors such as education and personal efforts. Of course, applying intellectual stimulation to children can promote the development of IQ, but the decisive role of innate qualifications cannot be ignored. To be more detailed, it can be understood by dividing it into the following constituent elements.

Ability to recognize one's own emotions:

- ① The ability to be aware of one's emotions and desires;
- ② The ability to reasonably control one's emotions and desires;
- ③ The ability to inspire oneself and make oneself more motivated;
- ④ The ability to handle things persistently;
- ⑤ The ability to accept things optimistically and actively strive for progress.

Ability to recognize others' emotions:

- ① The ability to perceive the emotions of others;
- ② The ability to imagine the stance and intentions of others;
- ③ The ability to understand what others want to say;
- ④ The ability to convey one's emotions to others;
- ⑤ The ability to communicate with others.

When dealing with education issues, neoclassical economics can also be referred to as the “overall science”, which attempts to depict the overall situation of education using aggregated indicators such as the total amount of human capital stock or average years of education in a country. Whether it is Eric A. Hanushek et al.'s measurement of education quality, which is currently valued by mainstream education economists, or James J. Heckman's discussion of non-cognitive skills, they still have not escaped the stereotype of “holistic science”. The rich structural differences caused by historical and institutional factors in education seem to exceed the academic imagination and thinking horizons of mainstream economists. From the latest research by Akmoglu et al., even for the most influential institutional school of economics scholars today, their discussion of the endogeneity of education is limited to the understanding of education under the Christian tradition. Due to their lack of understanding of education in other countries and regions in the non-Christian world, this aspect is particularly weak.

9. The Contribution of Non-Cognitive Abilities to Educational Policies

At the beginning of the first part, Heckman and Coates summarized the erroneous shift in education policy towards relying on standardized achievement exams, while neglecting the importance of personality in American life. They focus on the General Education Development (GED) score test, which accounts for a small proportion of about 12% of all high school degrees. And evidence has been presented to suggest that although GED holders are as smart as high school graduates, they perform much worse in education, career achievement, health, and

other happiness indicators in their later years. The most obvious problem is that the success of predicting non cognitive skills (i.e. roles) far exceeds intelligence, and GED holders hold fewer of the former. HHK mainly relies on developmental psychology and personality theory to prove the concept of personality. They described in detail the so-called “five major personalities” (rigor, openness to experience, extroversion, affinity, and neuroticism). However, the results of extensive research indicate that among these components, HHK's most prominent ability in predicting success is self-control (sense of responsibility, top 5). Of course, personality is not a new concept, nor is self-control. More than 30 years ago, Bowles and Gintis (1976) emphasized non cognitive skills rather than cognitive skills in social and economic mobility, and Jencks (1979) did the same. Looking further ahead, about a century ago, sociologist Emil Durkheim called for people to pay attention to the importance of self-discipline and moral education, and John Dewey was almost the same at the same time. Previously, HHK quoted Ralph Waldo Emerson's earlier assertion (1849) that character is higher than intelligence. This idea can be said to be ancient, as Aristotle's Nicomachian ethics and character training also appeared in early books.

The empirical argument of HHK is that there is a difference between cognitive skills - IQ (fluid intelligence/ability) and achievement test results (crystalline intelligence) - and non-cognitive skills, particularly self-control, which explains the unique differences in multiple life outcomes that maintain constant intelligence. Surprisingly, some of these mechanisms are very simple and are said to explain the different life paths between GED holders and high school graduates. For example, 'seating time' may seem mediocre, but it is a part of high school graduation that instills certain qualities that are missing from the short-term preparation courses that define GED. The evidence provided by HHK indicates that holders of the GED program are as smart as high school graduates, but they perform much worse in their future lives. Cognitive ability is not enough. This is contrary to the testing based logic that dominates the policy discussions surrounding it.

10. Conclusion

The author believes that the theory of human capital forms the cornerstone of the origin of educational economics and determines the characteristics of its relationship with the real world. Systematically reflecting and criticizing the shortcomings of human capital theory, and further discussing the areas for breakthroughs in educational economics, should be the best commemoration of the fearless controversy and innovative spirit of the creators of this theory. The core message of China's education reform is non cognitive skills or character building, which is a key but underestimated determinant of life achievement, especially in the early stages of primary and secondary education. Therefore, overall character building should be an important agenda in the education system, not only in schools, but also in society as a whole.

The previous review in this article at least indicates that human capital theory is only a cluster in the vast forest of economic theories, and its emergence and development are closely related to the theoretical competition within the field of economics. There is still a certain theoretical competition within the discipline of economics, and analysis of different ideological orientations and research paradigms can objectively enrich people's understanding of different research objects. Therefore, in terms of educational economics, the first question that should be raised can be: how to draw balanced nourishment from the various competitive theories of economics from the development of one's own discipline? The source of vitality of educational economics may also be the limitation of this discipline, which has a strong practical guiding significance since its inception. Its followers have a strong political and practical consciousness from the beginning, and there is not enough self-criticism and

reflection when considering educational economics as a component of life power technology.

The current development status of such a discipline seems not limited to China. The differences in empirical testing of screening hypotheses among different countries are largely attributed to the different nature of each country's education system and labor market, without providing further systematic theoretical analysis. The discussion on the contrast between the private return on education and the social return on education has been superficial without further exploration. Adam Smith pointed out that it is precisely the traditional human capital theory that, due to its use of a pure learner's perspective and individualistic methodology, has had to or intentionally overlooked the institutional factors related to human capital transactions, which ultimately are the institutional factors that contribute to the occurrence and development of education.

However, within the field of educational economics, due to the lack of an integrated analytical framework that starts with institutions and structures, there is a lack of organic connections between the research fields of various branches, resulting in a pattern that is pieced together from different academic origins. For example, the analysis of the education production function, although focusing on studying what factors affect students' grades, so far, relevant discussions have often overlooked the most important influencing factors, namely the fundamental motivation and motivational factors in the education systems of various countries, such as “being a farmer in the morning and a farmer in the evening”, which are determined by social and political factors. This also indicates that the most important challenge in breaking through the limitations of human capital theory lies in the need for a stronger de Americanization international perspective and a longer-term historical perspective.

From a historical perspective, this article explains why the development of the education system predates the introduction of human capital theory, but only after the introduction of human capital theory did the economic function of education receive higher recognition and attention. In the long history of educational development, the theory of human capital is only a cup of water drawn from the present world. Therefore, to establish an education based educational economics, the first thing to go beyond is the historical limitations of human capital theory.

As far as the author's “new human capital theory” is concerned, the “throwing” motion of “throwing bricks to attract jade” can be affirmed, and its coarseness is obvious, and more efforts are needed to achieve “jade”. As Becker reminded, 'It takes a theory to defeat a theory'. The effort to construct more theories that can form a competitive and balanced relationship with human capital theory should be welcomed by the creators of human capital theory who were not afraid of controversy and had a strong innovative spirit back then. This is also the necessary path for the revitalization and development of the discipline of educational economics.

Author Introduction

Lingxuan Fang (1983-), female, born in Tianshui, Gansu, is currently pursuing a PhD in Management Philosophy, with research interests in Human Capital, Education Management, Marxist Philosophy, and Economics.

Xiang Wei (1972-), male, born in Xiangyang, Hubei, is a professor and doctoral supervisor at the School of Business at the University of the Chinese Academy of Social Sciences. He is also a researcher at the Institute of Finance and Strategy at the Chinese Academy of Social Sciences. Main research directions: Service Economics, Leisure Economy, and Tourism Economy.

Reference

- [1] Becker, G. Human Capital [M]. New York: Columbia University Press, 1964.
- [2] Brunow S, Hirte G. The age pattern of human capital and regional productivity: A spatial econometric study on German Regions [J]. *Papers in Regional Science*, 2009.
- [3] Caselli, F., Li, W. J. C. The world technology frontier [J]. *American Economic Review*, 2006(96):499-522.
- [4] Chun Ben Boming (Japan), translated by Meng Haixia. Good character is taught: cultivating children with high emotional intelligence, resilience, sense of responsibility, and empathy [M]. China Friendship Publishing Company, 2021 (10).
- [5] Deng Wenqian. Analysis of Factors Influencing Non cognitive Ability under the Reform of Quality Education [J]. *Neijiang Technology*, 2022, 43 (06): 95-96+119.
- [6] Forslid, R., Ottaviano, et al. An analytically solvable core-periphery model [J]. *Journal of Economic Geography*, 2003, 3(3):229-240.
- [7] George Ku, Jin Honghao. Non cognitive abilities: cultivating core competencies for the 21st century [J]. *Peking University Education Review*, 2019, 17 (03): 2-12+187.
- [8] Heckman, James J., John Eric Humphries, and Tim Kautz, eds. 2014. *The Myth of Achievement Tests: The GED and the Role of Character in American Life*. Chicago and London: University of Chicago Press.
- [9] Hanushek, E. A., & Woessmann, L. (2015). *The knowledge capital of nations: Education and economics of growth*. MIT Press.
- [10] Heckman, J. J., Humphries, J. E. & Veramendi, G. (2016). Returns to education: The causal effects of education on earnings, health and smoking. NBER Working Paper 22291, Retrieved from <http://www.nber.org/papers/w22291>.
- [11] Herfeld, C. (2012). The potentials and limitations of rational choice theory: An interview with Gary Becker. *Erasmus Journal for Philosophy and Economics*, 5(1), 73—86.
- [12] Herrnstein, Richard J. and Charles Murray. 1994. *The Bell Curve: Intelligence and Class Structure in American Life*. New York: Simon and Schuster, Free Press.
- [13] J. R. Walsh. Human capital view, *American Economic Review* [M]. 1935.
- [14] Robert J. Sampson*, The Characterological Imperative: On Heckman, Humphries, and Kautz' s *The Myth of Achievement Tests: The GED and the Role of Character in American Life* [J]. *Journal of Economic Literature* 2016, 54(2), 493 - 513. <http://dx.doi.org/10.1257/jel.54.2.493>.
- [15] Schultz T W. Editorial comments on human capital special issue [J]. *Journal of Political Economy*, 1961, 70:1-8.
- [16] Schultz. On Human Capital Investment [M]. Translated by Wu Zhuhua, Chen Jianbo, Zhang Wei, et al. Beijing: Beijing Institute of Economics Press, 1990: 206-209.