

Generic and Specific Skills as Components of Human Capital: New Challenges for Education Theory and Practice

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Abstract

Human capital theory in recent decades has become the basis for educational policy in many developed countries. Expert discussions, however, often undervalue research findings and developments related to this theory that since the 1970s have consistently enriched understanding of how human capital contributes to personal well-being and socioeconomic development of society as a whole. Educational policy lags behind these elaborations, which leads to a decline in the impact of education upon development worldwide. In the 21st century, fundamentally new trends in socioeconomic dynamics pose unprecedented challenges for educational systems around the world, including Russia. Despite the quantitative growth of money and time spent on education, performance per unit of education costs has fallen. The human potential,

created by education, is facing more and more difficulties in its capitalization: economic growth is slowing down at both at the country level and globally. This situation brings to life new attempts to claim insignificance of education for economic growth and for individual success. So far, these attempts have not been very influential in educational policy, but in many countries, such arguments already serve as a backdrop for budget decisions that are detrimental for education. Educational systems need to complement practices that contribute to the development of human capital. In this regard, several theoretical elaborations that have not yet become part of the mainstream discussion on human capital, could be helpful for understanding the role of human capital in socioeconomic progress and possible ways to improve it in the short and long term.

Keywords: human capital; hard skills; soft skills; generic skills; labor markets; demand for skills; educational policy; entrepreneurship

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Linking Education and Socioeconomic Development through the Prism of Human Capital: a Historical Survey

Today, most scholars and experts agree that it is the human being — rather than natural resources or physical and financial capital—that drives socioeconomic development. Human capital is comprised of knowledge, skills, and practices that allow human beings to create income and other useful benefits for themselves, their employer, and society as a whole (above initial investment and operating expenses) [Kuzminov, Frumin, 2018]. This definition aligns with that of other sources [OECD, 2001; Tan, 2014; Becker, 1962; Kapeliushnikov, 2012; Anikin, 2017; etc.] in applying the concept of capital to the human being not in a metaphorical way, but rather as a direct and methodologically sound use of this economics term. That is, the human being is viewed as an asset that creates economic utility exceeding the expenses needed to develop and maintain it.

A two-level analytical framework of individual and aggregate data is most commonly used in academic discourse to analyze economic behavior. In contrast, our definition emphasizes three levels of investment and return vis-a-vis human capital: individual, corporate, and societal. While human capital is inseparable from its dependence on the individual student or worker, no matter who the investor happens to be, the effects of human capital and the products of labor can be subject to many possible forms of appropriation. These forms, which we may call institutions, can lead either to a relatively balanced distribution or to significant imbalances. For example, an imbalance in favor of corporations occurred in the early period of industrialization [Rosenberg, Birdzell, 1986; Didenko, 2015] and an imbalance in favor of the individual may be seen on the labor market for highly qualified IT specialists today.

The problem of human capital gives rise to a tension between classic theoretical models [Blaug, 1992] and socioeconomic reality, and it is this tension that some critics of the concept use in their arguments against it (Tan, 2014; Klees, 2016). However, economic descriptions of the world often pay insufficient attention to corporations as intermediaries between the individual and society. Institutionalists, both within economics [North, 1990] and from sociology [Meyer, 2010], have been attempting to fill this gap. We focus on all three levels on which we can observe the returns on human capital.

No matter the scale or point of view of observation, the logic of investment is always present at the core of “human capital” as a concept. As we begin to analyze how this theory has developed and the ways in which it has been applied, it will be useful to start with a short historical account of the evolution of investment in human capital. We will look at various factors involved in this process, and its effects. In contrast to previous surveys [Anikin, 2017;

Sweetland, 1996; Goldin, 2016], we shift our focus away from theoretical models of technological development in the eighteenth to twentieth centuries. Instead, we analyze investment, the resulting growth in the reach of education, and the economic outcomes. We limit our study to education, which we see as the key form of investment in human capital, but we recognize the importance of others such as healthcare and culture.

A Historical Overview of Investment in Education: Towards a Theory of Human Capital

Over the past 150 years, governments and their budgets, rather than private companies or individuals, have taken the lead role as investors in human capital around the world, including investment in education [Tanzi, Schuknecht, 2000]. In 1776, Adam Smith proposed the concept of “public goods,” which he defined as goods that are highly valuable to society but are so expensive to produce that any individual or private group would lose money on them. Smith cites education as one of the obvious examples of this [Smith, 1937, p. 681].

In highly developed countries, large scale education has been seen as a necessity for progress since at least the middle of the eighteenth century, with progress generally understood as the socioeconomic and political development of nation-states [Soysal, Strang, 1989; Meyer et al., 1992]. The first decrees on mandatory primary schooling for certain segments of the population in Prussia and Austria emerged in the second half of the eighteenth century, and the Danish state-run primary education system was created in 1721 [Zinikina et al., 2016]. Rapidly growing systems of this type in North America, Australia, and New Zealand reached 86% of children by 1900, while 67% of children in Northern Europe, 29% in Eastern Europe, and 33% of children worldwide received primary education in that year [Benavot, Riddle, 1988, p. 202].

The growth of the education system was among the leading ideas of the time. Émile Durkheim saw education as a guarantor of social solidarity in a time of deeply divided labor [Durkheim, 2006]. Max Weber viewed education as a prerequisite for forming a society of the modern, rational type [Myers, 2004]. John Stuart Mill recognized that formal education was the only way to foster an enlightened society capable of effectively operating democratic institutions [Macleod, 2016]. Alfred Marshall, one of the founders of modern economics, criticized his predecessors for failing to pay enough attention to the person as a key element of the means of production, like any other form of capital [Marshall, 1890, p. 295].

The growth of education systems reached its zenith in the twentieth century. In 1870 there was not a single major developed country with a budget for education that represented more than 1.5% of GDP,

with 0.1% in Great Britain, 0.3% in France, and 1.3% in Germany [Roser, Ortiz-Ospina, 2019a]. By 1950, most of them had surpassed 2%. In 2017 the average EU government spent 5% of GDP on education, while Russia now spends 3.6% [Kuzminov, Frumin, 2018].

Investment in education has led to an increase in the literacy rate worldwide from 20% in 1880 to 85% in 2014. The average number of years of schooling in developed countries has gone from less than three to more than ten during the same period [Roser, Ortiz-Ospina, 2019b].

Public spending on formal education in developed countries has been growing especially rapidly since the 1960s, up from 2-3% of GDP in 1960 to 4-5% in 1980 [Roser, Ortiz-Ospina, 2019b], along with the share of GDP (5.2% of GDP growth in high-income countries in 1964 to 5.4% in 1973). Comparable rates of growth are observed in middle-income countries as well [World Bank, 2019].

Before the Second World War, the majority of developed countries provided for the spread of primary and secondary schooling [Meyer et al., 1992]. Starting with the 1960s, however, there was an unprecedented expansion of higher education systems [Cantwell et al., 2018]. In 1940 only 20 out of every 10,000 people on the planet were university students, but by 1960 the number was close to 40. By the year 2000, it was more than 160 [Schofer, Meyer, 2005].

In the early 1960s, Gary Becker [Becker, 1962], Theodore Schultz [Schultz, 1960, 1961], Jacob Mincer [Mincer, 1962], and Edward Denison [Denison, 1962], laid the groundwork for the theory of human capital. Their work coalesced into an empirically founded and complete conceptual model. By showing the mechanisms by which investment in education leads to economic growth, the model became the basis for new policies of increasing investment in education around the world.

There were, however, other reasons to invest in education. Among them were the need to foster civic literacy among the population as a means of stabilizing the political system, the desire to support social mobility, the project of building a nation state, and the social necessity of caring for children and youth [Kuzminov, Frumin, 2018; Meyer et al., 1992; Carnoy et al., 2013]. It is impossible to account for the massive boom in the scope of education (including post-secondary) over the past centuries without factoring in all these elements. Our analysis takes education's role in economic development as the primary reason for investing in it. In the case of contemporary Russia, we observe this playing out in a situation of relatively scarce economic resources [Kuzminov, Frumin, 2018].

In the third quarter of the twentieth century, rapid GDP growth and the expansion of education systems created a unique moment in history in which society

was not only becoming convinced of the “economic benefits of education,” but also had the wealth at its disposal for new investments in this sphere. Of course, the GDP growth of the 1960s that created this unprecedented economic surplus was produced by cohorts of previous generations' education system [Marginson, 2017; Manyika et al., 2015].

According to McKinsey, most countries in the Organization for Economic Cooperation and Development (OECD) doubled or tripled expenditures on education in real prices between 1970 and 1994 [Barber et al., 2011, p. 20]. Despite this, educational outcomes by OECD metrics failed to grow or diminished [Barber et al., 2011]. It turned out that low outcomes in education could be observed even in countries where the financing of education had increased significantly. The trend continued, however, as average spending per student in OECD countries went up 34% between 2000 and 2008 [Jensen, 2012]. There have been many examples demonstrating that active investment in education systems is far from being a guarantee that a country will achieve stable economic growth [Klees, 2016; Tan, 2014]. This has caused many to doubt the importance of education as a driver of economic growth. More and more economists have returned to ideas from the 1970s about the leading role of institutions for which a good education system — as well as economic growth — are outcomes of their work rather than key inputs [Acemoglu et al., 2014].

The concept of a “middle income trap” has been used to characterize the situation in which a country has used up all of its possibilities for growth, i.e., mass industrialization and investment brought about by the availability of cheap labor with the minimum required level of education, and now finds itself unable to compete with more developed countries in high-tech sectors which provide a higher level of income. According to the World Bank, only 13 of 101 countries listed as “middle income” in 1960 were able to move into the “high income” bracket by 2008 [Agenor et al., 2012].

The “micro/macro paradox” [Pritchett, 2001] stimulated discussions on the role of education in economic growth. It describes a situation of lower macroeconomic outcomes for a country as a whole, while at the same time there is an increase in the rate of education and in the results of education at an individual level. Peru, Jordan, Mexico, and Venezuela all saw growth in the education level of the population and even an increase in the premium paid for highly educated labor, while simultaneously experiencing a slowdown of economic growth or even negative macroeconomic trends, including decreased productivity [Tan, 2014]. This was partially explained by the idea that new graduates were favoring jobs based on effectively extracting rent from existing assets over those that produced new value, i.e. becoming lawyers rather than engineers. New data

from China shows that the global economy's biggest engine of growth is now facing the same problem [Yao, 2019].

Today, Russia is facing a similar problem, which can be defined as “undercapitalized human potential” [Kuzminov, Frumin, 2018]. The relative value of a higher education for an individual is greater in Russia than in many highly developed countries, with about a 60% premium in wages [Kuzminov, Frumin, 2018, p. 97], as compared to 20% in Sweden, 56% in Great Britain, and 56% in countries that are both in the EU and the OECD.¹ According to the World Economic Forum (WEF), Russia is also among the top five countries in the world by formal education rates. However, the country is in 42nd place by the metric of “Know-How” (relating to effective labor practices in the workplace) and 89th in “Availability of Skilled Employees” [WEF, 2017].

Therefore, Russia is among the dozens of countries that fall victim to the middle-income trap, in which the growth of the education system does not result in the expected growth of productivity.

The global economic crisis further damaged governments' ability to invest in education and did nothing to increase the rate of return. According to World Bank data on the impact of education on salaries, derived using the Mincer earnings function, this correlation has remained stable throughout recent decades [Psacharopoulos, Patrinos, 2018]. In this climate, critics of human capital theory became more vocal, attempts were made to label it as ignoring structural and institutional problems in the economy, and there were calls to discredit it completely [Klees, 2016; Tan, 2014].

One of the most evident and fundamental problems of contemporary education is the increase in costs. On average, the cost of college in the US rose more than 170% from 1997 to 2017, while costs for the nation's education system rose 150% [Ritchie, Roser, 2019]. No other sector of the country's economy saw such increases in the cost of products or services. Even in healthcare, costs went up only about 100% in the same time period [Ritchie, Roser, 2019]. In the education sector, this phenomenon points to low productivity growth [Baumol, 2012] and a major crisis in the efficiency of the nation's economy as a whole. Ironically, the education system is seen as a driver of labor productivity, based on data gathered in the USA during the first two-thirds of the twentieth century.

Discussions of the link between education and economic growth often miss out on the fact that education systems in most of the world, including Russia, developed in ways that diverged from classical human capital theory. Already in the 1980s, an emphasis was made not only on formal characteristics,

such as the number of years of schooling, but also on a variety of content-based characteristics, for example the capacity for non-routine action.

The move from theory to practice in developing human capital often runs into difficulties verifying conceptual models. In comparative studies between national datasets, a narrow methodology became widespread wherein the dependent variable is the rate of return of education as the individual level, and the independent variable is the number of years of schooling [Psacharopoulos, Patrinos, 2018]. The clear advantage of this approach is that it makes it possible to expand the set of countries in the analysis, since data about years of schooling and wages tends to be most widely available. However, its disadvantage lies in the inability to shift towards other, more precise methodologies for assessing human capital and its macroeconomic effects, including GDP data. It was precisely the impact of education on the economy, measured by GDP, that took center stage when the theory was being formulated. In the 1960s, Edward Denison showed that education is responsible for more than 70% of US GDP [Denison, 1962, 1966]. Most subsequent studies chose to focus on measuring returns on education at an individual level, based on various factors including years of schooling, the formal level of education, test results, and so on [Tan, 2014; Klees, 2016]. Nevertheless, the effects of education on total productivity remains a subject of interest today [Lange, Topel, 2006]. Human capital is an important element in Paul Romer's “endogenous growth” model [Romer, 1990a, 1990b].

It must be noted that the studies done by leading research centers using the narrow methodology for assessing the role of education in the economy using data about the reach of different levels of schooling by no means exclude the possibility of looking at qualitative indicators such as the cognitive and non-cognitive skills of the population [Lange et al., 2018]. However, the tendency both in Russia and internationally has been to give insufficient attention to these aspects. The quality of education, even at the post-secondary level, often continues to be assessed in terms of reach, while effects are measured largely at the individual level. On one hand, there is potential here for valuable findings. For example, through a meta-analysis of hundreds of individual studies, experts at the World Bank [Psacharopoulos, Patrinos, 2018] found that individual return on investment in education has not fallen over the last few decades, and hovers at about 9% per year of schooling. This number represents an average of all countries analyzed across all levels of education over the past fifty years. On the other hand, however, a number of substantial questions remain beyond the scope

¹ See: https://stats.oecd.org/Index.aspx?DataSetCode=EAG_EARNINGS, viewed 25.05.2019.

of this research. We would like to determine which elements of human capital, and by what mechanism, create prosperity at the levels of the individual, the corporation, and the nation.

We suggest that discussions about education policy should be based on a more multidimensional view of human capital.

First, there must be a full accounting of the elements of human capital that have emerged in the scientific literature of the previous decades as key factors for determining the condition of the education system. These include cognitive skills, which are measured in PISA (Programme for International Student Assessment) [Hanushek, Woessmann, 2010], generic skills, which were recognized as significant at the end of the twentieth century [Levy, Murnane, 2004], and noncognitive skills [Kautz et al., 2014], which have been shown by dozens of studies to have an impact on individual success. Attempts to study human capital comprehensively are being undertaken in Russia, but generally exist outside of direct engagement with government policy [Gimpelson, 2018]. Unfortunately, policy debates are often limited to ritualistic invocations of PISA and demonstrate a lack of understanding of some of the deep contradictions involved in such a discussion. For example, the traditional forms of instruction at Russian schools, with an emphasis on memorization or mastery of theoretical models without full-fledged practical application, do not map well to the methods of the OECD and PISA, which focus on the practical application of knowledge and fostering student motivation.

Second, more attention must be paid to socioeconomic changes, partially brought about by technological progress, that put into play components of human capital previously left behind on the periphery of the scientific mainstream. Certain characteristics of workers gain new importance in a modern economy in which both the structure and the relations between the individual, the workplace, technology, and employers are rapidly transforming. Among such characteristics may be the “capacity to adapt in a situation of uncertainty,” which was proposed by Schultz way back in 1975 [Schultz, 1975] but still has not found its place in debates about education.

Shifts in the Understanding of Human Capital during the Second Half of the Twentieth Century and the Beginning of the Twenty-First

Gary Becker, Theodore Schultz, and Edward Denison showed that by combining physical capital and the quantity of labor with an indicator of human capital representing the quality of labor, the resulting model accurately describes the growth of the US economy and some other developed countries in the

middle of the twentieth century [Becker, 2009]. It is important to note that during the 1950s, when the founders of human capital theory were gathering their data, the best information available to them was related to the reach of education. Objective, standardized studies of educational outcomes as a metric for the quality of education were not widely recognized at the time, neither at the national nor international levels. The first nationally representative tests appeared only in 1963, and their sample was extremely limited [Kamens, 2015, p. 421].

The authors of human capital theory accepted a formally fixed level of education as equivalent to the actual body of economically useful knowledge and skills. This included skills like basic literacy and arithmetic, the majority of which, when taught in the education system, increased individual productivity across the entire workforce. This component was called “general human capital.” “Specific human capital,” on the other hand, includes skills required for specific jobs and taught in specialized educational settings, not only in formal instruction but also acquired on the job and learned through years of experience. The Mincer earnings function, in which salary is a function of education and work experience, has become the main instrument for assessing the effectiveness of investments in human capital. It is important to note that this function gives greater weight to specific human capital as compared to the general: the log of salary equals the sum of the linear function of years of schooling and the square function of work experience [Mincer, 1974; Psacharopoulos, Patrinos, 2018].

Up until about the 1990s, governments developed their education policies based on the theory of human capital, aiming for the growth of formal indicators. A parallel line of discussion existed, trying to work out metrics for the types of human capital that would meet specific needs in the economy. Mark Blaug, for example, posed a question about which specific mechanisms and elements of human capital were responsible for creating the empirically proven link between education and individual income [Blaug, 1972]. Was it specialized skills learned through education? Perhaps there were innate psychological traits which the system selected for? Or was it membership in a given social class that gave students greater chances for success during their years of schooling and in their career? Blaug posited that there was a situation of internal competition among various mechanisms of development within the system of education and the labor market. In such a situation, he saw all three answers as valid and non-contradictory. Even if the labor market gives preference to people from affluent families and those who possess special talents, the education system retains its key role both as a mechanism of selection and as a contributor of useful skills that raise a student’s human capital.

By directly connecting education with the labor market, the theory of human capital began, in the 1970s, to revive the issue of “employability,” which was first discussed in the beginning of the twentieth century [Guilbert *et al.*, 2016; Gazier, 1998]. In this early moment, researchers and administrators were most interested in the cumulative impact of education upon employment. Employability was understood as the congruity between the characteristics of graduates and specific needs of the labor market and was not problematized from other points of view [Kroll, 1976]. In recent years, however, some researchers directly raised the question of the need to treat employability as a separate skill or set of skills which school programs should be asked to teach, and which cannot be subsumed in other subjects [Yorke, Knight, 2005; Guilbert *et al.*, 2016].

Despite the criticisms directed towards human capital theory, empirical studies in both developed [Goolsbee *et al.*, 2019] and developing [Yao, 2019] countries confirm the underlying hypothesis about the positive effects of formal education on the opportunities of a given individual on the labor market, from the point of view of employment guarantees as well as salary.

Under such conditions, it makes sense to have increasing the reach of education as a major goal, especially tertiary education. According to the British Council [British Council, 2012], the growth of this segment in the current decade has averaged 1.4% annually, which means that the college and university student population has been growing by about 21 million per year. On average, an extra year of schooling provides a greater individual benefit than other forms of investment, such as stocks or real estate [Psacharopoulos, Patrinos, 2018]. For critics, however, the slowdown in global growth as well as in most national economies remains the largest contradiction of human capital theory, given the high performance of data about the return on education at the individual level [Klees, 2016].

Mapping Education onto the Labor Market: from Skills to Jobs

A common explanation for the low rate of impact of formal education upon economic growth is a disbalance or “mismatch” between education and the labor market. This is cited both in Russia [Roshin, Rudakov, 2015] and internationally [Caroleo, Pastore, 2017].

Statistics show that more than 20% of Russian students enter college to study some form of engineering and this segment has been growing since 2014 [Kliachko, 2017]. At the same time, the labor market does not support a corresponding number of jobs that would make use of these engineering skills — assuming that all engineering graduates do possess such skills [Gimpelson, 2016]. Furthermore, in a situation of slow economic growth, the automa-

tization of production in high tech sectors of the Russian economy leads to significant drawdowns in the number of employees. This decrease has been as much as 20% in certain sectors between 2005 and 2016 [Gimpelson, 2016]. As a result, engineering graduates are often forced to work as drivers, salespeople, or even security guards. The rate of employment in the retail sector rose 2.4-fold in the same period [Gimpelson, 2016].

Ultimately, educating engineers on a mass scale ends up being a poor use of time for the majority of students and a waste of money on the part of the state. The system for training a highly qualified workforce is fundamentally disbalanced vis-a-vis the labor market and the needs of employers. This is true even in the rare cases when the needs of employers are clearly formulated. In the high-performance manufacturing segment, there continues to be a workforce deficit, including engineers. This was laid out in the WEF report, where Russia ranked 89th in the availability of highly qualified workers [WEF, 2017]. However, the mismatch applies not only to jobs available on the labor market and specific professions associated with them, but also to skills that are in demand more broadly [McGuinness *et al.*, 2018]. This means that the problem lies not only in the sphere of specific human capital, but also in the general sets of skills that are applicable to different jobs and even to various industries. In the global context, systems of higher education feel just as much pressure to confront the mismatch in skills as they do the mismatch in professions. A wide-ranging study of the US labor market showed that employers were less likely to face a deficit of specialized hard skills than they were of soft skills, such as general attitude, the ability to take on responsibility, and so on. [Handel, 2003]. Another study showed that changes in the demand for widely applicable skills on the US labor market since the turn of the twenty-first century are partially responsible for the decrease in upward mobility among workers with a higher education [Beaudry *et al.*, 2016]. Conclusions such as these contradict traditional understandings about the primacy of specialized professional skills — and the forms of instruction or work experience associated with them — for success on the contemporary labor market.

Education systems reacted to the increased demand for soft skills over hard, narrow ones by increasing the share of students studying humanities-based subjects and teacher education (from 19% to 24% of bachelor’s students in Norway, France, Great Britain, and Germany, but only 12% in Russia [Kliachko, 2017, p. 24]. Another response to this demand was the spread of new universities following the classic liberal arts model of education. Studies show [Telling, 2018] that students in highly developed countries are most likely to prefer this model of education because of its ability to open doors to

a large spectrum of potential professional trajectories. Liberal arts students are not in danger of being trained as a specialist in a field that is dying or not in demand, which is an appealing advantage in the face of growing doubts about the effectiveness of mass higher education systems [Telling, 2018].

The deficit in general human capital has also been reflected in the widespread addition of entrepreneurial elements to curricula, including in secondary and tertiary education. Countries with leading positions in the innovation economy have been the most active in this area. In Finland [NAE, 2014] and British Columbia, Canada, an entrepreneurial component is part of the “technology” curriculum. In a paradoxical turn of events, the tertiary education sector, which traditionally specializes in producing specific human capital and specialized work skills, has become increasingly permeated by entrepreneurial education. This is especially noticeable in countries and regions at the forefront of technological progress. The largest intellectual hub of Silicon Valley, Stanford University, has significantly boosted its entrepreneurial offerings over the last twenty years, including programs within technical and software disciplines. According to one large-scale survey in 2011, more than one third of Stanford graduates started their own business, and a similar percentage have experience working at a startup. More than half of the graduates that became entrepreneurs said that Stanford’s entrepreneurial spirit was what drew them to the university [Eesley, Miller, 2018]. All told, Stanford graduates founded almost 40,000 companies and created more than 5 million jobs, generating annual revenue of \$2.7 trillion [Eesley, Miller, 2018].

The tertiary education sector in Russia is also showing a distinct tendency towards renewal, but the impact of entrepreneurial education on the economy remains small. Businesses created in collaboration with universities have so far failed to compete effectively [Karpov, 2018]. Whereas the Massachusetts Institute of Technology (MIT) incubates more than 150 new companies annually, 24 of the top 40 Russian universities generated less than ten startups between 2009 and 2015 [Karpov, 2018]. Nevertheless, a net positive effect of specialized entrepreneurial training has been proven for the development of Russia’s business ecosystem. [Dukhon et al., 2018].

A question remains about which specific elements of entrepreneurial training stimulate growth. Is growth driven more by specific know-how in business administration, by soft skills like leadership and cooperation, or by a broader culture of creativity and innovation? Expanding on Blaug’s initial idea, we can surmise that the effects are cumulative, and that the diverse array of programs such as entrepreneurship in digital technology, social entrepreneurship, and corporate entrepreneurship foster both personal initiative and the skills to capitalize on it. Such

universal competencies turn out to be valuable for a multitude of different roles on the labor market and in a variety of structural and cultural contexts. As an important and yet little-understood element of general human capital, entrepreneurship demands further study.

Contemporary Studies in Human Capital as Support for an Evidence-based Education Policy

In order to execute an evidence-based policy for developing human capital it is not enough to simply acknowledge the rift between the needs of the labor market and the output of the education system, whether in terms of which programs of study are chosen or which skills are taught. Creating effective education policy instruments requires that we understand, on one hand, which specific elements of human capital are most important, and on the other, which conditions and mechanisms can bring these elements to fruition in practice. Without this, the growth of “undercapitalized human potential” is inevitable, and we will continue to see people with valuable skills who are not fully integrated into the economy, are unable to find jobs, or do not have the skills necessary to grow in a way that would benefit themselves and society as a whole.

Beginning in the 1980s, many researchers have worked towards creating conceptual models for specific components of human capital. These studies fall into three general categories which are directly linked to the emergence of new datasets. The first category looks at domain-specific cognitive skills, whether within a profession or a discipline. The second category focuses on the study of noncognitive skills and personality traits. The third category analyzes employer demand for universal, foundational, or key competencies, which include both cognitive and noncognitive elements.

Studies of “Traditional” Cognitive Skills

Standardized testing of knowledge and skills emerged in the beginning of the twentieth century and became widespread in the 1930s but was used mostly for student selection and military recruiting [Gibby, Zickar, 2008]. National standardized assessments of education outcomes that could be used for studies rather than just the selection of human resources entered the mainstream in the second half of the century. Large-scale international assessments of education quality became available in the 1980s [Kamens, 2015], and made a significant impact upon the theory of human capital.

In the late 1980s, Erik Hanushek brought together the results of the new international assessments with economic data and put forward his thesis [Hanushek, 1986]. He asserted that it was not so much the increase in years of schooling and degrees granted that had an impact on economic growth, but rather the increase in the quality of human capital, as mea-

sured by the development of cognitive abilities. This thesis is now confirmed by large-scale comparative studies conducted by the World Bank [Lange et al., 2018].

Hanushek's assessments of educational quality made use of the set of metrics that was available for analysis on a national level and for international comparison. Since practically all the countries in the world adhere to traditional disciplines in education, researchers used international TIMSS and PISA results, especially in math and natural sciences, to measure cognitive skills [Hanushek, Woessman, 2007].

Hanushek and his colleagues showed a high degree of explanatory power in the data collected by international assessments of education outcomes when applied to subsequent rates of economic growth. In large part, this was the main catalyst for respected institutions like the World Bank [Lange et al., 2018] to start paying close attention to cognitive skills, which can provisionally be defined as: *The ability to process information (in text or numerical form) and subsequently make a decision or solve a problem using logical reasoning and the creation of new ideas* [Hanushek, Woessman, 2008].

In 2017, however, a study conducted by Hikaru Komatsu and Jeremy Rappleye raised questions about the validity of Hanushek's thesis in the twenty-first century and asked whether there was still a high degree of explanatory power in subject-based testing vis-a-vis economic growth [Komatsu, Rappleye, 2017a]. The authors showed that while the explanatory power for the last decades of the previous century (using R-squared) was quite high (>35%), in this century it decreases significantly (<20%). Looking beyond Komatsu and Rappleye's own arguments, one possible reason for this effect might be that such tests fail to reflect a number of components of human capital that are necessary for the contemporary economy. Additionally, there are major differences between the TIMSS and PISA assessments which must be taken into account. If the former has always been intended as a tool for measuring how well students were learning a given school subject, the latter has sought to approximate, if only in test form, the practical application of knowledge. One of the possible explanations for Komatsu and Rappleye's discovery, then, could be that as a narrowly subject-based test TIMSS does not provide information about general skills important for the twenty-first century. PISA, with all its shortcomings, at least partially solves this problem, and in fact continues to move towards a greater assessment of universal competencies while remaining largely a test of subject-based cognitive skills.

The scholarly community today has not come to a consensus about the usefulness of data from international assessments of education quality in explaining economic growth. According to David Kamens

[Kamens, 2015], the correlation between students' test results and economic growth strengthened after 1990, thanks to an increase in the number of participating countries and an expanded capacity for selection within each country. John Meyer, Francisco Ramirez, and their colleagues concluded that there was a nonsignificant correlation between test scores and national economic growth, but even that was only evident when rapidly growing Asian countries were included in the study [Ramirez et al., 2006]. In general, the lack of consensus on this matter does not mean that cognitive skills are not a factor in economic growth, and in fact it is most likely that they do have a significant impact. However, the situation does suggest that the role of education is not reducible to the cognitive component of human capital.

“Fluid Intelligence” and Personality Traits as Noncognitive Skills

James Heckman, Tim Kautz, and their colleagues have critiqued the types of academic achievement testing on which PISA is based, claiming that they “... do not adequately capture noncognitive skills—personality traits, goals, character, motivations, and preferences that are valued in the labor market, in school, and in many other domains.” [Kautz et al., 2014, p. 2].

The authors view noncognitive skills not as innate personality traits, but as abilities that can be taught. Meanwhile, traditional testing, including PISA, focus only on one aspect of intelligence, which has been called “crystallized intelligence” in the scientific literature; i.e., on already processed knowledge. “Fluid intelligence” cannot be measured by standardized tests, since one would need to assess how well a person learns rather than how well they apply things they have already learned [Kautz et al., 2014, p. 7].

Looking at numerous studies, mostly conducted in the US during the last quarter of the twentieth century, Heckman and his colleagues established that “achievement tests,” i.e., tests of cognitive abilities given to teenagers, can explain only 17% of the difference in income when they become adults [Kautz et al., 2014, p. 2]. If one looks at the explanatory power of once-popular IQ tests, it is only about 7% [Heckman, Kautz, 2012]. By analyzing the wealth of research carried out by American psychologists, Heckman was able to assert that noncognitive traits were of greater importance for success both in school and in life.

The authors defined noncognitive skills as “all personality traits that are not measured in traditional achievement tests” [Kautz et al., 2014, p. 8]. The goal here is to create a method of analysis for the “significant, but not fully described” elements, which appear in the theory of the resource-production ratio as entrepreneurial abilities. Heckman bases his criteria on the so-called “Big Five” theory [Judge et al., 1999]:

- Extraversion;
- Agreeableness (friendliness, ability to come to consensus);
- Conscientiousness (awareness, including responsibility, the ability to follow a plan, executive ability);
- Emotional stability (a term describing the general ability to act rationally in stressful situations, as opposed to emotional instability and impulsiveness);
- Openness to new experiences.

Citing the meta-analysis of empirical studies [Barrick, Mount, 1991], Heckman points to a statistically significant correlation of 0.22 between labor output and the “conscientiousness” element of the Big Five.

One of the most compelling comparative studies on the significance of cognitive and noncognitive traits of teenagers vis-a-vis their working life as adults was conducted by Heckman himself, along with his colleagues [Kautz *et al.*, 2014]. The researchers looked at two groups of American students: those who graduated from high school in a traditional campus setting, and those who did not finish all twelve grades but took a high school equivalency test of cognitive ability, the General Education Development test. It turned out that although both groups demonstrated essentially the same level of cognitive ability as measured by achievement tests, there were significant differences in noncognitive abilities and subsequent differences in income. In particular, parameters such as openness to new experiences and agreeableness had stronger correlations with subsequent success in education and in the workforce than “traditional” cognitive traits [Kautz *et al.*, 2014]. These conclusions prove the validity of psychological and socio-psychological aspects of human capital, which can be interpreted as an expansion on the “general component” of human capital.

Another of Heckman’s arguments in favor of promoting the development of noncognitive skills through education policy is based on surveys of employers in the US and Great Britain. These place a higher value on skills such as “executive ability,” “teamwork,” or “working with clients,” than literacy and arithmetic [Kautz *et al.*, 2014].

Furthermore, the authors claim that noncognitive skills are more amenable to change than cognitive ones. In the context of human capital development, Heckman concludes that the noncognitive aspects should be the center of attention for the education system.

Universal Competencies as Undervalued Elements of Human Capital on a Changing Labor Market

Many researchers of human capital have counterposed cognitive and noncognitive traits. Since both are recognized as valuable, they are slowly being in-

tegrated into a single conceptual framework. An important step in this process has been the discussion of universal basic skills [Ludger, 2015].

The international tests discussed above are directed primarily towards assessing routine and discipline-specific skills, such as knowledge of specific mathematical formulas and the ability to make calculations without errors. These cognitive skills can be called traditional insofar as they adhere to a conventional image of a “smart” person from the early twentieth century, equating education with erudition in the sense of having a large body of knowledge in a narrow set of disciplines. The overall effect is essentially one of prioritizing specific human capital, which is more true of TIMSS than of PISA. The latter places more emphasis upon meta-subject learning while maintaining a focus on mathematics and physical sciences.

Unlike Hanushek and Heckman’s investigations, the theory of universal competencies, starting with the 1970s, has looked less towards finding empirically proven links between specific skills and subsequent economic success (whether by individual or by country). Instead, it takes as a starting point the direct needs of the labor market and the business community, which has slowly been learning to articulate its requirements for generic skills [Slavendy, 1969].

Rigorous investigations at the end of the last century showed significant changes in the types of labor over the preceding decades. Overall, they reflect a growth in non-routine tasks as well as in the volume of work based on communication (Figure 1) [Levy, Murnane, 2013]. This is directly linked to the growing role of universal competencies, including communication skills, cooperation, analytical thinking, creative action, and others, which together form the core of a new understanding of human capital for the twenty-first century [Levy, Murnane, 2004; Anikin, 2017].

The tests on which Hanushek based his work did not measure skills like critical thinking, self-direction or communication. However, contemporary discussions of education are more and more interested in measuring universal competencies. In 2015, the PISA program, one of Hanushek’s primary sources of data, augmented its testing with sections for measuring problem-solving ability in groups. This work is set to develop further, for example with new tools for measuring entrepreneurial ability or creativity [He *et al.*, 2017].

Compared to their peers working in the same industries 30 or 50 years ago, contemporary workers are much less likely to have to apply, for example, subject-based math skills: calculators are available on even the most basic smartphones [Levy, Murnane, 2013]. However, the most basic cognitive skills are still in high demand, as has been demonstrated by studies such as PIAAC, conducted by the OECD. These studies show a strong correlation between the

cognitive literacy of the adult population and macroeconomic indicators, for example in European countries [Woessmann, 2016]. It is also worth noting the high level of congruence between the results of PIAAC and PISA, as noted by OECD experts [OECD, 2016]. Additionally, European studies have empirically proven a positive effect on national economic growth of applying cognitive skills in the workplace [Valente et al., 2016]. Recent international studies have also shown that PISA results have a significant impact upon the entrepreneurial activity of a given population [Hafer, Jones, 2015].

Ultimately, basic subject-based cognitive abilities often serve as the foundation for learning more complex meta-subject skills and are positively correlated with certain noncognitive skills. This was demonstrated by a meta-analysis of studies about links between cognitive skills and the Big Five personality traits among adults. Certain traits, such as openness to new experiences show a strong positive correlation with cognitive skills [Curtis et al., 2015]. At the same time, the relationship between subject-based cognitive skills, universal basic skills, and personality traits is complex and not direct [Stankov, 2018]. Special effort is therefore required to develop universal, soft skills for the twenty-first century and the noncognitive components of human capital.

Fundamental Differences between the Ideas of Heckman and Hanushek for Education Policy

Hanushek and Heckman come to differing conclusions about the aspects of human capital that are most important for economic growth, and what recommendations to make for education policy.

Hanushek emphasizes relatively traditional, subject-based cognitive skills and gives priority to formal schooling, especially mathematics and natural sciences. Using the PISA model of assessment, a large number of studies were conducted in specific countries in an attempt to bring to light which aspects

of national education systems were responsible for the best test results. The key success factors traditionally cited in education policy circles are [Deng, Gopinathan, 2016]:

- The quality of teachers;
- Modern school administration practices;
- Effective system for assessing learning outcomes;
- Systemic reform of the educational process directed towards stimulating initiative, independence, and creativity in students.

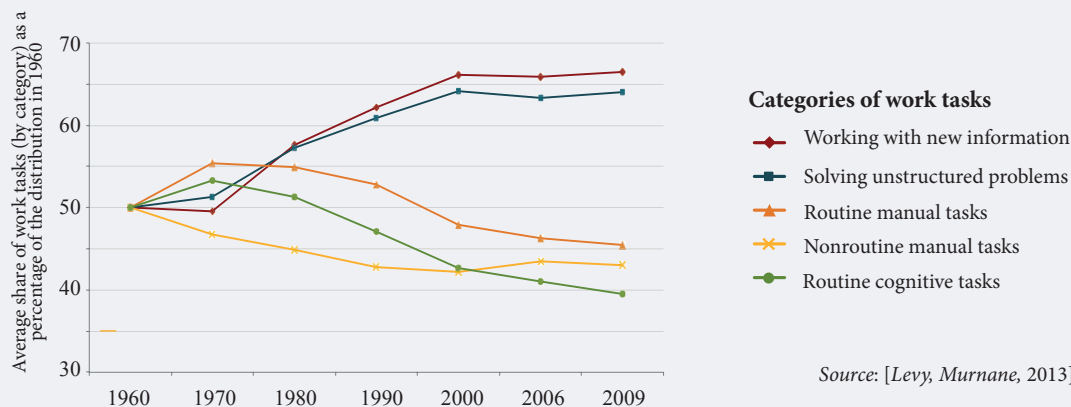
The last point acts as a kind of bridge between traditional subject-based cognitive skills and the more complex, universal, and noncognitive ones discussed by Heckman. In his opinion, however, the priority must be to go beyond merely finding the right content for classrooms or finding highly qualified teachers: we must look for new ways of organizing the education process as a whole. A large-scale review of interventions in the US education system [Kautz et al., 2014] shows the strong potential of projects that engage students in constructive, applied activities, such as industrial processes outside the framework of formal education.

New Findings in the Study of Human Capital and their Impact on Education Policy

The PISA Effect

After the significance of the cognitive skills measured by PISA became universally accepted, the term “PISA shock” emerged in the literature [Pons, 2012]. The term describes the effects of unexpected assessment results on national education policies and even on the self-conception of ordinary citizens. Germany in the 2000s is a negative example of this, while Portugal in the 2010s is a positive one. There are numerous well-known examples of interventions

Figure 1. Changes in the Nature of Labor in the US Market, 1960-2009*



Source: [Levy, Murnane, 2013].

in school systems directed more or less explicitly towards raising PISA test scores. Current attempts to modernize the Russian school system are following a similar path.

Research conducted by McKinsey [Mourshed et al., 2010], encompassing around 575 specific interventions in twenty local school systems, confirmed that the actual content of school curricula in the vast majority of countries is directed towards maintaining traditional approaches of drilling and routine cognitive tasks, i.e., teaching rather than learning. Education systems maintain a strict disciplinarian character and are insufficiently proactive in supporting creative, team-based, and project-based work.

The track record around the world indicates that contemporary education systems have not yet figured out how to develop the array of skills needed to produce general human capital for the twenty-first century. Even if we limit our view to those countries that have been recognized for achieving breakthroughs in PISA, we will find a gap between the idea of “best practices” and the reality of concrete reforms.

The example of Singapore [Deng, Gopinathan, 2016] shows that the decisive element in the country’s success was not the widely lauded set of universal decisions such as the recruitment of top graduates into teaching, the development of a system of continuing education for teachers, or the modernization of curricula. Rather, it was contextual factors, including national cultural traits (such as Confucian values, which are also present in other Asian countries that perform well in PISA) and institutions (the “high stakes” model increases the importance of achievement in high school). Singapore, however, officially declared in 2011 that they would shift the paradigm of education from developing skills directly for use in the workforce to developing the person in a broader understanding of the term and transcending the specific needs of the labor market [Reimers et al., 2019].

Another PISA star, Finland, illustrates the primacy of contextual factors over “best practices.” Despite the OECD’s efforts to promote innovative teaching practices, which are seen as such an important element of PISA success, Finnish teachers practice traditional methods. Their work is supported by the high degree of social trust and professional status accorded to school workers in Finland [Simola, 2005].

Finland, Singapore, South Korea, Japan, and other leading countries in the PISA rankings all have a strong emphasis on mathematics courses, natural sciences, and languages in common, rather than the types of general competencies suggested by the OECD as paths to PISA success [Waldow et al., 2014]. The example of Russia is instructive, since the PISA methodology has been taken up as the official instrument for measuring education quality. This

includes the national-level project “Образование,” or “Education.” The lack of tangible improvement of the national outcomes in these ratings is used as evidence to justify keeping in place the same archaic school models that the OECD is trying to modernize.

Komatsu and Rappleye’s comparative study showed a negative correlation, on the level of average PISA scores by country, between national indicators of functional social science literacy and the average level of independence, interest, and motivation of students when studying the same disciplines [Komatsu, Rappleye, 2017b].

Finding an answer to the question of PISA’s cumulative effects has turned out to be a difficult task. Despite what the OECD asserts, universal solutions such as developing innovative teaching methods or focusing on general competencies as a way of raising the quality of education are most often secondary in significance compared to local cultural and institutional contexts, which even in leading countries keep their traditional character and prioritize learning over teaching. When it comes to innovative pedagogy, there is the issue of insufficient growth. A set of case studies, which included Russia, showed that there was no noticeable change in the basic teaching processes in leading countries. The idea of fundamentally transforming education systems to shift towards fostering initiative, independence, and creativity remains in the realm of expert discussions and isolated experiments.

There has been growing debate around how the education system can strive to foster “agency” in students. This usage of the term is different from the one used in institutional economics in the framework of “principal/agent,” where the agent is seen as dependent on the principal and acts in a purposeful, rational manner to maximize personal benefit within institutional boundaries. Rather, we are using agency in the sociological sense, and looking at it through the framework of “structure/agency” [Udehn, 2002], in which agency is a force capable of changing structures and institutions, not just reinforcing them. In this context, agency is synonymous with initiative, active independence, or transformative, expansive action.

Experts in this field are more and more likely to view agency as a value in itself, not reducible to other skills or components of human capital [Estrin et al., 2016; Bosio et al., 2018]. However, this approach is not in the forefront of most countries’ education policy. The recent OECD project Education 2030 may be the exception, since it looks at agency as both a key outcome of and a condition for education [OECD, 2018]. It seems ultimately that the issue is not simply that the OECD’s solutions are not universally applicable, but also that countries are not transforming their education systems actively enough.

Developing Noncognitive Skills through the Education System: Lessons for Policymakers

Heckman and his colleagues, who did a detailed survey of all the notable interventions aimed at developing noncognitive skills (mostly in the US) in their report to the National Bureau of Economic Research (NBER), pointed out that such skills had only been accepted as valuable by experts in recent years. This explained the lack of major national projects in this sphere. The authors also point to the dearth of data on the effectiveness of interventions aimed at fostering noncognitive skills in students beyond childhood. There are very few examples of such efforts, at least in Heckman's main area of interest, the US.

Summarizing the conclusions drawn from the experiments, which were largely run in low-income and problem student populations, the researchers report that programs limited to in-school activities had a limited impact upon teenagers, as compared to mentoring or apprenticeship programs based in the workplace. A large portion of the interventions analyzed showed no positive effect and in some cases even showed a negative one [Kautz *et al.*, 2014]. Issues arose in part with programs that immersed participants in a rigid system, thereby depriving them of a sense of autonomy and the confidence of being able to solve a problem independently [McCord, 1978]. In other cases, the reasons for the lack of success may have been the opposite extreme, where participants felt protected and supported no matter how poorly they performed individually [Rodriguez-Planas, 2010].

The significant distribution in the effectiveness of the projects analyzed by Heckman, including negative values, points to the lack of readily available and tested solutions on the part of the education community for fostering noncognitive skills (especially among older children and teenagers).

It is therefore easier to figure out how to stimulate self-sufficiency, grit, and other such traits in individuals than it is to adapt education systems towards developing personality traits [Ng-Knight, Schoon, 2017]. The leading research centers are working hard towards developing corresponding metrics but are still far from reaching this goal. In practice, most countries including Russia have failed to fully integrate Heckman's key insight about the impact of personality traits upon personal success. This can partially be explained by the lack of consensus around a proven instrument for measuring these kinds of traits. More importantly, however, is that even when such an instrument exists, actual practices within the pedagogical community have so little to offer in terms of fostering these traits that only the most successful education systems of traditionally leading countries have the capacity to attempt to develop them. Singapore, for example, is already a PISA leader, but now is conducting experiments to

integrate formal and informal teaching on the basis of new technology [Looi *et al.*, 2016].

Developing Universal Competencies as a Practical Challenge for Education

The rise of concepts like "core competencies" and "21st century skills," thanks in part to the efforts of the OECD [Ludger, 2015], has been an important step towards bridging the gap between the practice of education and the needs of the times. The demands associated with these terms have made their way into the national education standards of the majority of OECD member countries. However, the lists of competencies used by countries and institutions differ significantly. Russia has been active in the international debates and Russian experts have tried to formulate their own list of key competences. Many existing classifications use a combination of three main categories: cognitive traits (such as higher order thinking), social traits (such as communication skills), and socio-psychological traits (such as positive self-image) [Frumin *et al.*, 2018].

The specific formulation and indicators of key competencies continue to lack focus and often overlap, which prevents the international community from reaching the same kind of consensus as with PISA instruments or the Big Five personality traits. A lack of accepted mechanisms, in turn, makes it difficult to develop a set of well-founded practical recommendations. There is uncertainty about both the effects of a supposedly universal skill on individual achievement, as well as the question of education's role in fostering it.

In numerous countries and regions such as Finland and British Columbia, the methods described earlier for developing entrepreneurial skills in the context of formal education have already been implemented as required elements of the school curriculum. This alone makes them worth looking at in the context of universal competencies. At the same time, entrepreneurial education is among the methods most highly criticized in the professional literature, despite its growing popularity. Existing models have been declared insufficiently effective, while proposed alternatives demand radical changes in teaching methodology while also being non-responsive to new discoveries in the field of human capital. Most of the proposed ideas are in the form of boutique programs rather than mass-scale solutions [Oosterbeek *et al.*, 2010; Martin *et al.*, 2013; Neck, Green, 2011].

The Gap between Theory and Practice in Human Capital Development

A cumulative analysis of studies of education practices and various components of human capital yields a wealth of material for further research and policymaking. Two key components of human capital can be said to influence both individual success

and economic development on a national level: cognitive (subject and discipline-based) and noncognitive (including the Big Five personality traits) skills. Many experts emphasize the former as being more important.

Still, there seems to be no universal solution for the problem of developing either aspect of human capital within the framework of national education policies. At first glance, it looks like there is a consensus around the basic instruments that can be used to develop cognitive skills, but detailed analyses of success stories like Singapore [Deng, Gopinathan, 2016], Finland [Simola, 2005], Korea [Waldow et al., 2014], and Japan [Komatsu, Rappleye, 2017a,b] raise serious questions about the validity of this consensus. The ways in which noncognitive skills can be developed have not been studied sufficiently and there is an absence of solutions that are recognized to be effective, with the exception of a generally accepted hypothesis about the effectiveness of mentoring and apprenticeship programs tied to specific professions and workplaces.

Despite the rapid growth in the costs associated with education reform around the world, experts agree that national education systems are not very effective at raising the level of human capital. The key to understanding the mismatch between increasing investment in education and economic growth may be found at the level of institutions. The ways in which education is organized, its content and methods, do not match up with the criteria that have been developed within human capital theory over the past half century.

Another sign of the disconnect between education policy and theories of human capital is the lack of consensus around instruments for measuring cognitive and non-cognitive traits that are relevant for post-secondary education, not counting the level of salary after graduation. University rankings are geared towards measuring scholarly output rather than student traits relevant to human capital and there is no system for testing the quality of vocational training.

A key instrument for university oversight from the point of view of human capital is keeping track of graduate job placement, not only by university but also by major—including salary data. In Russia, centralized systems of statistical monitoring by the government and central oversight of universities make this task easier [Ministry of Education and Science, 2016]. The advantage of the Russian approach, in part, is that data gathering can be done on the basis of objective data from the Pension Fund rather than self-reporting.

However, Russia finds itself at a disadvantage even in this sphere. Statistics on salary and employment data for graduates are gathered in all advanced economies, in one form or another. For example, the

US Bureau of Labor Statistics (BLS) publishes both official salary data and self-reporting from various categories of respondents, including education data not linked to specific colleges and universities. Data about the latter is gathered via special (non-annual, and therefore limited) surveys conducted by the US Department of Education.

Nevertheless, even the most detailed information does not make up for the lack of real data about the skills possessed by graduates or of those components that result in a return on human capital. It will be necessary to conduct studies, including international ones, on the professional competencies of students and graduates [Loyalka et al., 2019]. So far, there have not been many of these done.

New Challenges to the Theory of Human Capital

One of the main challenges of the situation described above is the lag in implementation on the part of education policy. Theoretical developments in the study of human capital, both specific (which we associate primarily with subject-based knowledge and skills) and general (associated with universal basic skills and personality traits), have not been implemented at scale. There exists an equally serious challenge for the education system, however, which has been underestimated in the work of Heckman and Hanushek. Before going further, we would like to highlight some important similarities in their two approaches, having already analyzed the major differences:

1) The thesis of “homogeneity in time.” Both concepts include obvious or hidden assumptions about the stable and unchanging nature of basic socioeconomic conditions in developed countries over recent decades. The relative importance of both discipline-based and noncognitive skills is treated as something like a constant. In the case of Hanushek, this is done explicitly: the figures for cognitive subject-based skills are built into his regression models for GDP. Heckman does not build regression models stretching over a half-century, partially due to the lack of representative data. However, his argumentation itself leaves no doubt that the environment is an unchanging one. For example, a significant portion of his arguments are based on studies conducted in the first half of the twentieth century, when personality traits were recognized as a factor of success by psychologists, while the Big Five model only appeared in the 1960s.

2) The thesis of “homogeneity in space.” Both researchers assume that the laws of human capital development they describe are universal not only time, but also in space. In the work of Hanushek, this is directly revealed in the universal regression model, or “success formula,” and the thesis that follows from it, in which the effect of raising average PISA scores for any country by one standard deviation has the same

effect on the economy [Hanushek, Wovssmann, 2010]. Heckman also directly asserts the “universal value of noncognitive traits across cultures, regions, and societies” [Kautz *et al.*, 2014, p. 2].

3) Following classical postulates of economic theory, both authors accept the possibility of directly extrapolating from the return on human capital at an individual level (in the form of higher wages for more educated/higher skilled workers) to cumulative return at the level of society as a whole (in the form of GDP growth and other macroeconomic indicators). Because of this, the aforementioned micro/macro paradox goes unnoticed, as does the problem of the middle-income trap.

We view these aspects of the two authors’ work as excluding the possibility for human capital to directly influence the formation and evolution of economic institutions. The aspects of human capital analyzed by Hanushek are related to “modern” jobs, which are supposed to already exist at the moment in time when human capital enters the labor market. Heckman, meanwhile, seems to attend mostly to the social aspects of work. He shows the importance of developing not just universal cognitive skills that are directly valuable for solving on-the-job problems, but also those that allow one to successfully live amongst other people, build relationships, and solve problems together. Heckman also looks at individual traits that allow one to adapt to already existing institutions, rather than push for the creation of new institutions. It is not surprising, then, that his prime example of mechanisms for developing noncognitive skills are traditional nineteenth-century formats like mentoring and apprenticeship [Kautz *et al.*, 2014].

These common assumptions inherent to Hanushek and Heckman’s approaches have a major influence on contemporary education research as well as policymaking in this field. Their approaches are not fully sufficient, however, to confront the new challenges facing human capital development, which are discussed below.

The Role of Human Capital in Socioeconomic Development in the Twenty-First Century: New Challenges and the Goal of Fostering Agency

The ever-changing nature of contemporary business has reached a level that would probably have been unimaginable in 1975, when Theodore Schultz conceptualized the capacity for action in situations of uncertainty. Schultz highlighted a specific, entrepreneurial aspect of human capital, “allocative abilities,” which allowed a person to manage his or her knowledge and skills, position them in an economically sound manner, and find the optimal use for them in business. In his Nobel lecture on December 8, 1978 [Schultz, 1978], he underscored the fact that the

abilities he had written about were important not only on the labor market, but also in the household and when making decisions about one’s educational trajectory. Schultz claimed:

Human capital contributes to labor productivity and to entrepreneurial ability. This allocative ability is valuable in farm and nonfarm production, in household production, and in the time and other resources that students allocate to their education. It is also valuable in migration to better job opportunities and to better locations in which to live. [Schultz, 1978].

Schultz’s approach differs from other models in that it rejects the idea that human capital immediately and automatically reacts to the situation presented by the labor market. Even when there is a direct market demand, far from everyone is willing to relocate to a new city, retrain for a new profession, and change jobs in search of a better life, meaning that not everyone possesses the decisively important abilities to achieve individual success. Unlike Schumpeter, who saw entrepreneurial abilities as a kind of natural talent unrelated to the economic situation, Schultz insisted that the education system increased a person’s effectiveness in a situation of unpredictable change, instability, and risk [Piazza-Georgi, 2002].

Despite how often Schultz is cited, especially in the literature on economics [Acemoglu, Restrepo, 2018], management, and innovation [Lundvall, 2010], his main idea about the entrepreneurial component of human capital has remained on the periphery of contemporary debates about education [Klees, 2016; Tan, 2014; Marginson, 2017], even though it began to be discussed back in the early 2000s [Piazza-Georgi, 2002]. It is evident, however, that Schultz’s approach provides convincing material for arguing against critics of the theory of human capital and its usefulness for education policy [Klees, 2016; Tan, 2014; Marginson, 2017]. The growing number of entrepreneurship programs in the tertiary education sector can be seen as a pragmatic solution appearing naturally within the system and gaining more and more traction on the free market. However, the attention being paid to the entrepreneurial component of education remains insufficient and pro forma. Only a handful of countries and regions have integrated systematic entrepreneurship training into the school curriculum. Unfortunately, the growing number of such courses of study in the tertiary sector has not come with a corresponding rise in quality, even though there has been a visible effect on new business startups, including in Russia [Dukhon *et al.*, 2018].

From our point of view, the tectonic shifts of the past decades have not been sufficiently reflected in the political arena. They require not only that we finish building the current projects, but also that we totally rebuild many elements of the education system.

The volatility of today's economy and the instability of certain companies is due not so much to bad strategic planning, as to objectively rapid changes in technology, which also demand new skills on the part of workers [Bessen, 2016]. The idea of a vocational training that lasts a lifetime does not match up with the contemporary trends in technological and social development. As noted in the report on trends in human capital by Deloitte, professional skills need to be refreshed every five years, whereas a career may be expected to last 60 or 70 years [Deloitte, 2017, p. 30].

The trends described above are reflected in the growth of the global service sector [ILO, 2018], the percentage of the workforce working as freelancers, which could reach 50% by 2027 [Upwork Global, 2017], as well as in the growing role of small and micro entrepreneurs in creating jobs around the world [Li, Rama, 2013], all of which serve to disprove the thesis about homogeneity in time. The world is changing, which means that the importance of certain elements of human capital may also be changing, along with the mechanisms by which they can be capitalized upon in the economy. Taking into account the uneven pace at which different countries enter into the fourth industrial revolution, the thesis of homogeneity in space — even within a single country — is put into doubt. This is especially relevant for such differentiated economies as Russia and China, where high-performing sectors exist side by side with poorly performing ones.

One powerful aspect of technological change driving many of these trends is the rapid growth of platforms for the sharing economy, which frees participants from the structural limits imposed by traditional ways of organizing business (at least in big cities and economic sectors with a high rate of technology penetration). Buyers, sellers, partners and clients are more and more likely to deal directly with one another via platforms, with public user reviews serving as quality control. The large sets of data that result from this are analyzed with the help of artificial intelligence (AI), allowing precise models of market trends to be created.

Changes in economic behavior resulting from the new platforms can be interpreted in various ways, from total denial of the platforms' structural importance to deeming them harbingers of the end of the market economy, which will be replaced by fundamentally new, altruistic forms of economic management [Arvidsson, 2018]. Other researchers believe that the platforms do not decrease competition, but rather escalate it [Arvidsson, 2018]. Some see the re-configuration of the economic behavior of platform participants as increasing the demand for aspects of human capital such as creativity, as well as social skills like the ability to form relationships based on solidarity [Carfagna, 2018].

The trends in the Russian economy, such as growth in retail sector employment and diminishing numbers of high-tech jobs, seem incompatible with the new technologies that are transforming the landscape of the contemporary economy. In fact, these two trends complement one another. The loss of manufacturing jobs has increased the number of people who categorize themselves as self-employed, without a permanent job, or freelancing, from 10% to 18% in just the year 2017 [National Agency for Financial Studies, 2017]. In addition, new technologies allow workers not only to opt out of traditional forms of corporate employment, but also to easily transcend geographical boundaries. According to RBC, a large share of Russian freelancers work for foreign clients [Li, 2017]. The result is a shift in the traits of organizations and individuals that enable them to find stability in uncertain situations. It may be the case that under such conditions, the key factors in boosting economic growth rates may be found not only in institutions, but also in the know-how of managers [Acemoglu et al., 2006].

A high level of training and skill may be far from the only factors in being successful in contemporary business. The literature on management is coming to embrace such terms as “entrepreneurial organization” [Kirkham, Mosey, 2017], “entrepreneurial manager” [Cook, 2017], “entrepreneurial behavior” [Jong et al., 2015], and so on. The term “transformational human capital” [Ling, Jaw, 2006] describes employees' capacity for corporate entrepreneurship in a broad sense, for example, proactively improving the company, its products, and working methods, which is considered to be within the purview of every employee [Birkinshaw, 1997]. This approach is embodied by the famous Japanese management system, which produced unprecedented rates of economic growth in the twentieth century [Suzuki, 2016]. One of the key traits of the Asian model of corporate management, most famously implemented in the Toyota management system [Liker, 2001], is constant oversight of business processes, not for maintaining the current system, but with the goal of finding and implementing rationalizing measures with the help of all employees. The Japanese system offers an alternative to the Western model of Weberian bureaucracy [Udy, 1959], with its narrowly functionalist specializations and strict hierarchies of subordination for carrying out approved directives.

The “new middle class” [Anikin, 2017], composed of the corporate elites that solidified their position at the top of the social pyramid in developed countries between the 1960s and 1980s, is being moved aside by other social groups vying for preeminent status as the corporate sector shrinks around the world, including in Russia. These groups include workers in the creative industries, highly qualified freelanc-

ers, and a new breed of entrepreneurs who not only eschew traditional corporate norms, but openly oppose them [Hesmondhalgh, Baker, 2010].

Furthermore, entrepreneurial skills are valuable not just for future entrepreneurs. A recent study of 18 OECD countries showed that these skills are important for today's graduates seeking careers in the corporate world. In other words, what we are dealing with is not so much entrepreneurial skills in the literal sense, which are only really used by a small percentage of the workforce. Rather, it is entrepreneurship understood as an ability to effectively find uses for one's own human capital. For their part, modern education systems reveal their own rigidity in their attempts to teach entrepreneurialism. This area of education, according to researchers, is held captive by traditional forms of pedagogy [Oosterbeek et al., 2010; Unger et al., 2011].

Education systems around the world are faced with the unprecedented challenge of trying to help every individual succeed in the world of platforms and freelancing. It is a world where habitual institutional boundaries are effaced, as are the boundaries between identity, lifestyle, ambition, and cultural standards [Meyer, 2010]. At the same time, there is a growing gap in income and lifestyle [Picketty, Zucman, 2014], which is often determined by the nature of one's human capital. Part of this equation is the development of AI [Brynjolfsson et al., 2018], which does not have the capability to replace humans in various professions entirely but can radically change professions and push human beings to the side. Complex routine skills, which were the bedrock of human capital's productivity throughout the twentieth century, are in danger of becoming obsolete. What is needed from the education system in this situation is, first and foremost, developing non-routine skills, both physical and mental, as well as other traits that help students develop and thrive in the world of platforms and AI. Today's workers are asked, essentially, to create a job for themselves and then adapt it to changing circumstances and technologies. Achieving such a goal for any country, including Russia, is possible only with a careful analysis of global trends and a thorough reconsideration of past experiences.

Researchers have offered a number of approaches to conceptualizing the changes happening in society. "Liquid modernity" [Bauman, 2005], for example, is characterized by the creation of new structures and forms of sociality (morphogenetic society), rather than reinforcing existing ones (morphostatic society) [Archer, 2013]. The British sociologist Margaret Archer writes about the "reflexive imperative in modernity" in terms of an individual's ability to problematize their social context during a sharp increase in the variability of the environment and a diminished role of "habitus." Following the theories

of Pierre Bourdieu, she writes that modern society is structured by unconscious dispositions for what to do, how to do it, and why [Archer, 2012].

The contemporary world demands something more than just high scores on some of the Big Five personality traits. Individuals are expected not only to be open to new experiences, adapt to external changes, and apply themselves to self-development, but also to proactively initiate new social structures and ways of acting. Therein lies a direct answer to the question of the link between human capital and institutions. In this approach, Heckman and Hanushek's frameworks are supplemented with an additional dimension of human capital, namely its role in creating and transforming institutions, also known as institutional entrepreneurship [Hardy, Maguire, 2017].

A related dimension, which is developing right before our eyes, is the ability to effectively take action in situations of structural uncertainty, or non-equilibrium, as Schultz calls it. This hypothesis adheres to new ideas in the field of fundamental sociology around the concept of agency. It centers on the question of the connection between social structures and human activity. As mentioned above, institutional economists vary in the ways in which they describe human agency. Bourdieu and Anthony Giddens maintain that an opposition between structures and activity is a false one [Archer, 2012, 2013]. However, contemporary studies attempt to measure growth in both institutional variability and the diversity of forms of agency.

These transformations raise some fundamental questions. For example, can individual or collective action set in motion structural changes, and if so, under what conditions? Do "good" structures create "beneficial" forms of agency in society, and if not, how do individuals and groups gain the skills of "institutional entrepreneurship" [Fligstein, 2008]? To what extent can the actions of social entrepreneurs be effectively described using the theory of rational action?

The authors of popular concepts like "expanded actorhood" [Meyer, 2010], "reflexive monitoring of action" [Giddens, 2013], "reflexive imperative" [Archer, 2012], "social skills" [Fligstein, 2008], and "strategic action" [Radaev, 2002] generally recognize the role of individual action in the deliberate transformation of institutions. One key question for our research is: to what extent can education help develop agency (initiative, proactiveness, active independence), given that it is presumed to be the highest priority element of human capital for the new millennium?

Besides the aforementioned sociologists, the most active discussions on this subject are happening among psychologists and theorists of new institutionalism. For example, Ingrid Schoon and her colleagues look at individual and personal mechanisms that allow people to "act in spite of," as Vadim

Radaev has written [Radaev, 2002], structural conditions [Gutman, Schoon, 2018; Ng-Night, Schoon, 2017]. Russian psychologists working with similar topics have analyzed the phenomenon of preadaptation [Astolov, 2015, 2017].

Education scholars have accumulated a wealth of insights in the study of agency. In a widely cited article [Reeve, Tseng, 2011], agency was looked at as a fourth category of student engagement in the learning process, on top of the traditional three: emotional, behavioral, and cognitive. “Agentive engagement” describes the student’s creative input in the learning process, including content and methods. Using quantitative data, the authors show that this type of engagement is both conceptually and statistically different from other forms of engagement in the learning process. The key value proposition of agentive engagement for education policymakers is that it allows students to independently shape their own learning environment [Reeve, 2013].

Jenny Arnold and David Clarke [Arnold, Clarke, 2014] surveyed the education literature on the subject of agency and found a strong interest among both theorists and practitioners in the idea of transforming the usual learning process into an integrated social activity directed by the students themselves. The authors looked at a wide range of ways of approaching and conceptualizing agency, including critical ethnography, symbolic interactionism, and many others. However, they never mention human capital. We believe that agency must find its place in the theory of human capital and that the work of Theodore Schultz provides one possible avenue of development.

Earlier we tried to show that the literature on the aspects of human capital related to transformation, entrepreneurship, and agency is not limited to academic texts. It also includes management literature, as well as insights from respected names in the business consulting industry. The business world contains a wealth of valuable observations and productive case studies that have as much to offer as all the theoretical baggage accumulated in academia.

The need to foster agency in contemporary education systems does not mean that it should be seen as a universal answer or a substitute for other widely acknowledged elements of human capital.

Due to the decline of traditional frameworks of social unity and solidarity such as family, religion, corporations, and nation-states, as well as the increased atomization produced by new models of economic growth, there is a danger of social polarization and anomie. In this context, it is important to find a balanced approach to developing agency. While some authors see the theory of agency as incompatible with the goal of fostering the transformational, entrepreneurial aspects of human capital through for-

mal education [Klees, 2016], we suggest unifying these approaches.

Conclusion

It is likely that by 2030 there will not be a single profession left untouched by the boom in new technologies. According to WEF data [WEF, 2018], the share of fully automated production tasks will increase by 20–50% across all industries in the period between 2018 and 2022 [WEF, 2018, p. 11]. These changes will continue to accelerate, which will further increase the stark inequalities in productivity that exist today both within countries and industries and between them. Those that fall behind in this global race will cede formerly held positions and lose the ability to provide a high standard of living for their changing populations. It is important to keep the demographics in mind, since populations around the world are rapidly ageing. This is problematic, given McKinsey’s conclusion [Manyika et al., 2015] that nearly 50% of global growth between 1964 and 2014 came as a result of workforce expansion. Today, this resource is fully depleted and is starting to show a negative trend. Overcoming this challenge and maintaining global GDP growth will require the productivity of each individual worker to multiply.

As we rethink the role of the individual in economic growth, we must distinguish between the ideas of human capital and human potential. It is high time to move on from the notion of the human being as a “widget,” produced in accordance with strict standards and placed in a predetermined role in a larger market mechanism. Human capital generated under such conditions is likely to prove counterproductive. A person with an externally proscribed and mismatched skillset is unlikely to find well paid work and risks becoming jobless altogether. An insight into this phenomenon can be found in the low salary premium of less than 10–12% earned by graduates with basic vocational training [Biliak et al., 2011]. In the Russian case, the situation is compounded by the mismatch between the labor market and the needs of an innovation economy, along with other macroeconomic demands. We insist on an expanded definition of human capital, with the following four categories of individual development:

- Specialized skills adapted to specific jobs, as described by the concept of *specific human capital*. According to classical human capital theory, it is created through focused education within a single subject or discipline, as well as work experience. Specific skills can be measured by professional examinations and other rigorous instruments. Attempts to create such assessments in Russia in the past five years have not fully come to fruition [Murychev et al., 2017]. There are several examples of successful exter-

nal corporate assessment tools: CFA², Microsoft Certified Professional (MCP)³, and others. While they do not have a significant impact at the national level, they can evolve into an effective indicator for the development of specific human capital in a given country.

- *General human capital 1* is comprised of universal skills like creativity, critical thinking, learning ability, organization, and the ability to work well with others. It is produced through creative, project-based work and requires supplementing traditional education with new types of collective and independent activities. Recent revisions of the PISA monitoring process by the OECD have made strides towards being able to measure this form of human capital.
- *General human capital 2* includes basic non-cognitive traits such as those found in the Big Five, as well as grit, perseverance, psychological adaptability in the face of social changes and challenges, and so on. These traits can be strengthened by specific activities and supported by an increased socio-personal component in traditional education.
- An expanded view of the concept of agency, or active independence, is the basis of *General human capital 3*, which engages with the entrepreneurial element of human capital [Schultz, 1978]. This category describes a person's ability to transform social structures and institutions, make improvements in the world in collaboration with others, and create new behaviors, including economic ones. For now, we will leave aside questions like whether agency is an accumulation of cognitive and noncognitive traits or a specific synthesis of the two. Suffice it to say that fostering this element of human capital presents an entirely separate educational task in itself.

Agency will play a key role in redesigning the way jobs are done and in implementing new technologies into labor processes. Not just entrepreneurs, but all workers in the near future will face the need to invent new tools and working methods. A WEF survey of international businesses [WEF, 2018] showed that the world's largest employers do not have any desire to retrain each one of their workers to help

them adapt to the demands of a slowing economy and increased competition. The corporate sector is ready to invest in training only for its most productive employees, and even in such cases the expectation is for them to take their own initiative. The rest of the workforce will likely shift to freelance and temporary employment [Upwork Global, 2017, p. 13]. Under these conditions, agency becomes the most important dimension of human capital for competing in the twenty-first century, since success will require workers to independently organize business relationships and create personal partnerships. Education systems in most countries are still too hesitant to accept new insights in human capital theory, whether from Erik Hanushek's research on the importance of cognitive skills or James Heckman's emphasis on noncognitive personality traits. The lack of dynamism in developing the necessary elements of human capital is reflected in the low rates of growth and socioeconomic progress, despite improvements in official education statistics. If these tendencies continue, some countries may soon see increasingly negative trends in traditional economic indicators such as GDP growth, unemployment, crime rate, and so on. On a subjective level, their citizens will have an increasing sense of social inequality and social tension. Among the highest risk groups are under-qualified workers who may be let go from familiar jobs in the corporate sector and be forced to find their footing on a freelance market for which they are entirely unprepared. In general, all workers who are trained to do routine tasks and unequipped for a non-routine world are at risk.

We must take steps today to develop human capital at the national level, or else we will find ourselves left behind in the global race decades from now. In a recent article, we proposed a number of specific reforms necessary for the Russian education system, both in the short and medium terms [Kuzminov, Frumin, 2018]. We hope that this current article will broaden the horizons and increase the scope of the debate surrounding human capital in education.

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² See: https://www.bloombergrepp.com/?utm_source=google_ads&utm_medium=cpc&utm_campaign=1619649578&utm_term=cfa&utm_content=308688167014&gclid=CjwKCjwiZnnBRBQEiwAcWKfYmJDx41CSm9p0dpuGCXauueHuF1q0SfVhHBBusBNF-7nDevYc7axTxoCDVsQAvD_BwE, accessed 19.05.2019.

³ See: <https://www.microsoft.com/ru-ru/learning/microsoft-certified-professional.aspx>, accessed 19.05.2019.

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