

EDUCATION AND COMPETITIVENESS – PRIMARY EDUCATION AS A PART OF MEASURING COMPETITIVENESS

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ABSTRACT

Competitiveness is measured by several indexes to determine positions of national economies. These focus mainly on economic competitiveness and partially build the primary education into the measuring system as the tool to develop human capital. The quality of the labour force and its capacity to evolve, its ability to adapt to new technologies, are much more important. The study uses two competitiveness indexes focusing on education, the Global Competitiveness Index and the European Regional Competitiveness Index, to show how primary education relates to the quality development of human resources and what their place and role is in strengthening international or regional competitiveness. Through the situation of primary teacher education in Hungary, the study points out its structural problems that have an impact on maintaining and strengthening the country's international competitiveness.

KEYWORDS

Competitiveness, primary education, Global Competitiveness Index, European Regional Competitiveness Index, Hungary

INTRODUCTION

At the turn of the millennium, a major challenge for the European Union was to define its own position both for internal and external actors. Hungary, as a Member State of the EU, has to match these priorities in its policies and programmes, not only because of its obligations as a Member State, but also because as a small, open economy faces with strong international competition.

Until the 1990s, the classic US-Japan-Europe triangle defined the development of the global economy. In the 1990s, however, the emerging economies grew so strongly, so China, South Africa, Brazil, Argentina, India, and the Asian Tigers were put on the global economic and political map. Innovation in assembly economies, which had previously based their economic growth on cheap labour, threatened the EU's position in technological competition. Emerging countries with double-digit GDP growth have turned export earnings into an intensive rather than an extensive economy, investing heavily in foreign direct investment not only in developing but also in developed countries, highlighting the risks of perverse capital flows, a now common phenomenon of international capital investment.

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The European Union has had to compete in the global economic area not only with the United States and Japan, which was struggling with the effects of the 1989/1990 crisis, but also with new emerging countries. The European Union responded to this competition with the Lisbon Strategy [12], adopted on the eve of the 21st century. The Lisbon Strategy set out to strengthen the framework for a knowledge-based economy in three priority areas. The economic pillar, focusing on the adaptive capacity of a competitive, dynamic knowledge-based economy, emphasised the development of research and development potential and set out the direction of investment support. But this is not possible without the appropriate human capital. Therefore, the second pillar became the social dimension, focusing on the development of human capital and the eradication of social exclusion to support the long-term supply of labour. The third pillar was environmental development. But the knowledge-based economy has required action at Community level in areas where cooperation has not reached the level of common policy. For example, economic, foreign, transport or customs policy, which help to make businesses competitive, were already operating at the level of common policies, but tax systems, business incentive programmes, indirect support through the monetary system or the development of the supply side of the labour market were not subject to the obligation to harmonise legislation affecting their operation, because of the different economic, political and social stress tolerances of Member States, which were within the bounds of national sovereignty.

For this reason, the Lisbon Strategy requires strong cooperation and the effective use of resources from all the Member States. This effectiveness was tested many times during economic crises or US-China and US-EU economic debates during the Trump-era. Competitiveness as a core question of the 21st century global economy cannot be measured exactly, more global and regional organisations strive to create the most appropriate tools and methodology to show that in numbers. However, all the competitiveness indexes incorporate the factors identified in the Lisbon Strategy into their measurement systems.

Measuring competitiveness

Theories of international specialisation explain the competitiveness of national economies in terms of the supply of factors of production. Adam Smith derived the success of nations from the factors of production (land, labour, capital). His theory is that the country in which fewer hours of labour are needed to produce a product and labour productivity is higher, gains an absolute advantage. In other words, the quantity and efficiency of labour affects the success of an economy. David Ricardo's theory of comparative advantage determined the position of national economies by comparing productivity and prices. Adam Smith and David Ricardo, however, focused their theories on labour, its value and productivity, and their models did not include the elements that link specialisation to other factors of production. The so-called Heckscher-Ohlin model, named after Eli Heckscher and Bertil Ohlin, can also be used for a complex analysis of the factors of production, comparing two factors of production and two products of two countries to determine the comparative advantages of each economy and thus the direction of international specialisation and competitiveness. [22]

Compared to specialisation theories that did not consider foreign market barriers, the Revealed Comparative Advantage (RCA) was an appropriate tool to measure the actual competitive advantage. Béla Balassa introduced this indicator in his 1965 study *Trade Liberalization and 'Revealed' Comparative Advantage* [5], which aims to examine the high export performance of a company, a sector, or an economy. In Balassa's view, the calculation of comparative advantage based on factors of production did not consider barriers to world trade or anti-competitive measures in national economic policies.

Theories of international specialisation define competitiveness at the level of a sector or product group. However, the complex economies and economic processes required the development of a more complex set of indexes that measure the performance of the whole economy in the global space. However, few simpler factor-based indicators such as Unit Labour Costs (ULC) or the Export Import Coverage Ratio are not able to measure all the factors affecting competitiveness in a national economy.

These indicators cannot measure the complexity of human capital as the factor of competitiveness. As Lisbon Strategy set out the goal of knowledge-based society that support economic development, the human capital has a central role. Basic skills, the ability of adaptation to new technologies are as important question in the field of human capital as the shortage of the labour force. In the lack of adequate labour force, human capital, the national economy cannot compete successfully with other economies, cannot absorb foreign direct investment and is unable to provide competitive goods and services for the international market. [20] [21] The most comprehensive measure of the competitiveness of a national economy is the World Economic Forum's Global Competitiveness Index (GCI), which uses 12 factors to rank the competitiveness of countries in the global economy year by year. The index is a weighted average of the components and their sub-elements. The weighting method depends on the development of the country in question. The World Economic Forum has defined the competitiveness of a country according to 12 components until 2019. [14] Methodology has changed since 2019 both at the level of the components and their sub-elements. [16] [17]

GCI components	
GCI framework until 2019	The GCI framework 4.0 since 2019
Basic requirements	Enabling Environment
1st pillar: Institutions	1st pillar: Institutions
2nd pillar: Infrastructure	2nd pillar: Infrastructure
3rd pillar: Macroeconomic environment	3rd pillar: ICT adoption
4th pillar: Health and primary education	4th pillar: Macroeconomic stability
Efficiency enhancers	Human Capital
5th pillar: Higher education and training	5th pillar: Health
6th pillar: Goods market efficiency	6th pillar: Skills
	Markets
7th pillar: Labor market efficiency	7th pillar: Product market
8th pillar: Financial market development	8th pillar: Labour market
9th pillar: Technological readiness	9th pillar: Financial system
10th pillar: Market size	10th pillar: Market size
Innovation and sophistication factors	Innovation Ecosystem
11th pillar: Business sophistication	11th pillar: Business dynamism
12th pillar: Innovation	12th pillar: Innovation capability

Figure 1 The GCI framework
Source: [14] [16] [17]

Comparing before and after 2019 methodology, the place of education has been changed. Before 2019, primary education was the part of 4th pillar together with health issue. The pillar was the part of basic requirements given its 25% where basic requirements gave 20-60% of

the total score referring to individual country/economy profiles. The health and basic skills of the working population are key to a competitive workforce. The higher the quality of health care available to the workforce, the better and the longer the workforce remains productive. The state of basic education is an important factor in calculating the training costs for prospective employers. Primary education gives 50% of pillar score where 4.10 Primary education enrolment rate is an accurate number of UNESCO statistics, while 4.09 Quality of primary education is based on answer of Executive Opinion Survey. [14] [16] [17]

4 th pillar sub-elements	5 th pillar sub-elements
A. Health (50%)	A. Quantity of education (33%)
4.01 Business impact of malariaj	5.01 Secondary education enrollment rate
4.02 Malaria incidence	5.02 Tertiary education enrollment rate
4.03 Business impact of tuberculosis	B. Quality of education (33%)
4.04 Tuberculosis incidence	5.03 Quality of the educational system
4.05 Business impact of HIV/AIDS	5.04 Quality of math and science education
4.06 HIV prevalence	5.05 Quality of management schools
4.07 Infant mortality	5.06 Internet access in schools
4.08 Life expectancy	C. On-the-job training (33%)
B. Primary education (50%)	5.07 Local availability of specialized research and training services
4.09 Quality of primary education	5.08 Extent of staff training
4.10 Primary education enrollment rate	

Figure 2. Sub-elements of 4th and 5th pillars until 2019

Labour force efficiency indicators were the part of efficiency enhancers in the 5th pillar (Higher education and training) given 35-50% of the total score referring to the country/economy profile. [14]

Higher education and training are also important for the workforce, since, like the 4th pillar, they directly affect the productivity of the workforce. The development of both higher education or training systems is a significant factor in a competitive environment to maintain competitiveness. A workforce that can be retrained quickly is more adaptable to new economic challenges and technologies.

Since 2019, primary education is not a separate part of a pillar. Sub-elements of 6th pillar of Human Capital reflect on the education system at a glance. Higher education is not a part of any pillars as a separate indicator. [16] The Global Competitiveness Report 2019 explains the change of methodology by the nature of higher education. As inequality of opportunities reduced and the participation in higher education increased, the lack of high-quality education and training causes underinvestment in human capital and skills that do not match with the needs of economy. For this reason, the labour force and the skills meet economic needs are measured in the new 8th pillar Labour Force.

Basic education and the quality of education system has remained the parts of the GCI after 2019. Pillar 6 focuses on skills of a competitive workforce among the efficiency enhancers. This is not a basic requirement like before 2019 but is categorized as a factor of efficiency. Dividing the pillar into current and future workforce examines the effectiveness of education system from two points. Indicators of future workforce provide half of the total score in Pillar

6 underlining primary education more than the previous rating method before 2019. 6.07 School life expectancy and 6.09 Pupil-to-teacher ratio in primary education are exact numbers and 6.08 Critical thinking in teaching is based on Executive Opinion Survey [13] answers.

6th pillar sub-elements

- A. Current workforce (50%)
 - I. Education of current workforce (50%)
 - 6.01 Mean years of schooling
 - II. Skills of current workforce(50%)
 - 6.02 Extent of staff training
 - 6.03 Quality of vocational training
 - 6.04 Skillset of graduates
 - 6.05 Digital skills among active population
 - 6.06 Ease of finding skilled employees
- B. Future workforce (50%)
 - I. Education of future workforce (50%)
 - 6.07 School life expectancy
 - II. Skills of future workforce (50%)
 - 6.08 Critical thinking in teaching
 - 6.09 Pupil-to-teacher ratio in primary education

Figure 3 Sub-elements of 6th pillar from 2019

Primary education has an important place and role in economic competitiveness from the point of both before and after 2019 methodology of GCI.

GCI methodology is in line with the Lisbon Strategy's priorities for a knowledge-based society and lifelong learning, where focusing on the acquisition of skills required by the labour market is emphasised in education as a fundamental factor for competitiveness. European Union applies Regional Competitiveness Index (RCI) at NUTS-2 level that bases on GCI before 2019 methodology. Its 11 pillars are grouped in Basic, Efficiency and Innovation indicators.

RCI		
Basic <ul style="list-style-type: none"> • (1) Institutions • (2) Macroeconomic Stability (national level) • (3) Infrastructure • (4) Health • (5) Basic Education (national level) 	Efficiency <ul style="list-style-type: none"> • (6) Higher Education, Training and Lifelong Learning • (7) Labour Market Efficiency; • (8) Market Size 	Innovation <ul style="list-style-type: none"> • (9) Technological Readiness • (10) Business Sophistication • (11) Innovation

Figure 4 RCI components

Education is divided into Basic Education of the Basic group and Higher Education, Training and Lifelong Learning among efficiency indicators. Basic education is measured at national level like Macroeconomic stability. Separating basic from other levels of education highlights its direct link to economic development and labour market needs. The latest report of 2019 however uses different approach as the previous 2016 one. Till 2016, the EU defined the Basic Education pillar as student's skills applying OECD's Programme for International Student Assessment (PISA) indicators and creating three sub-elements focusing on proficiency in science, mathematics and reading:

- Share of low-achieving 15-year-olds in reading (level 1a or lower),
- Basic Education Share of low-achieving 15-year-olds in maths (level 2 or lower),
- Basic Education Share of low-achieving 15-year-olds in science (level 1a or lower).

The 2019 excluded PISA result from its methodology because of the lack of comparability of national education systems and the questioned reliability of the results. Instead of PISA, RCI uses results of Eurostat Adult Education Survey measuring three indicators:

- Employer-sponsored training (Participation rate in job-related non-formal education and training sponsored by the employer),
- Access to learning information (% of people with access to information on education and training - age cohort 25-64),
- No foreign language (Share of people who self-reported that they do not know any foreign language - age cohort 25-64). [2] [4]

The methodology replaced the primary education with indicators reflect on present labour force and market needs focusing only on the present workforce. Before 2019, focusing on PISA result, the index measured the students' achievement after primary school. From 2019, the indicators do not consider the future workforce under 25, especially not those who get basic skills in primary education. From 2019, the RCI does not have direct link to primary education.

Hungarian primary education as an indicator

Before 2019, GCI ranked competitiveness in the field of primary education due to the quality of education and the enrolment ratio. The latest report applied the methodology is the Global Competitiveness Report 2017-2018 using data till 2016. The Visegrad Four countries' rank in

the field of primary education was quite close in 2007. From 2008, the Hungarian primary education ranking has shown moderate, and after 2013, a dramatic decline. However, enrolment ratio stayed steady. The quality of education caused the lower ranks pushing Hungary's primary education ranking to 86 from 61 out of 140 ranked countries between 2013 and 2016. [15] [19]

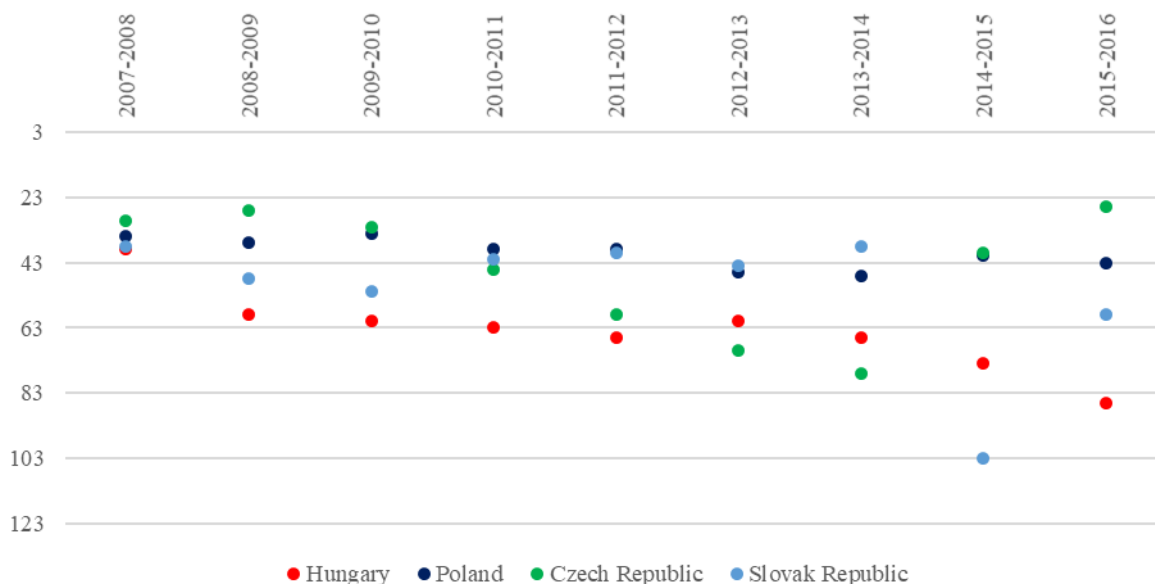


Figure 5 4th pillar B. Primary education rank of V4 (2007-2016)
Source: [15] [19]

The new methodology after 2019 does not consider any separate factors besides pupil-to-teacher ratio in primary education. Focusing on skills of future workforce in Pillar 6, Report 2019 scores Hungary 3,4 out of 7 in 6.08 Critical thinking in teaching, ranking her 72 out of 141 countries. Compulsory primary education enrolment and the relative high number of teachers gives 10,8 pupils/teacher value in 6.09 Pupil-to-teacher ratio in primary education, that provides rank 12 out of 141. Comparing rank 72 and rank 12, it is obvious, that scores of Skills of future workforce in Pillar 6 are raised by the pupil-to-teacher ratio. [18]

Critical thinking is a complex and soft content question of national curriculum, while the numbers of teachers are statistical facts. Analysing statistics shows that the 12th place in the GCI indicator for the pupil-to-teacher ratio could seriously worsen by the end of the decade. Therefore, the skills of future workforce sub-indicator will weaken significantly for Pillar 6. To reach higher rank, requires maintaining the good ratio and emphasize critical thinking in teaching in national curriculum.

Critical thinking, basic science and reading knowledge are also the part of RCI applied by the European Union to compare the competitiveness of the Member States in the field of basic education.

Considering PISA data, where negative scores mark competitiveness, only Poland shows achievement. The data for Hungary fall into positive territory and show an increase there, which clearly shows a decline in competitiveness in primary education. [1] [3] [6]

RCI also points problems of critical and complex thinking in Hungarian primary education.

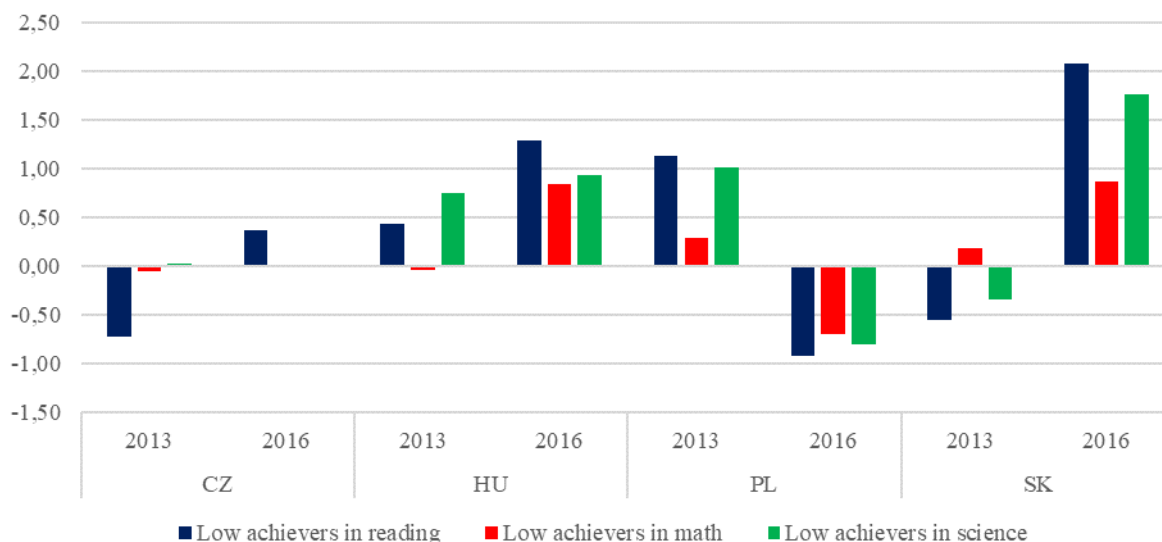


Figure 6 RCI Basic education component scores of V4 (2013, 2016)
Source: [1] [3]

MNB (Magyar Nemzeti Bank, Hungarian Central Bank) competitiveness report also highlights the importance of basic education as a crucial element in shaping economic developments with less focus in macroeconomic analyses. The Competitiveness Report 2021 underlines that the human capital in the right quantity and quality is essential to improve the skills of the workforce. Hungarian students are performing as expected at TIMSS and PIRLS tests that measure the learnt curriculum, but they are less able to apply what they learn in practice as PISA results show. Another problem from the side of knowledge-based society is that financial value of a teaching career - compared with EU countries - is lower than other professions requiring higher education. Primary education teachers earn 66% of OECD average and wages have not followed the dynamics of the economy. Lower than expected wages reduce interest in the profession and lead to career dropouts, and to career abandonment. The financial value of a teaching career in Hungary - at a similar level to the regional average – is below that of other professions requiring higher education qualifications. [21]

As MNB Competitiveness Report 2021 points out, teacher salaries do not make the profession attractive, which is reflected both in the number of teachers and the number of people interested in the profession and applying for teacher training. Following, the study uses medium-term calculations to illustrate the threats to improving competitiveness through changes in the number of teachers.

Numbers indicate the problems

The number of primary education teachers is only reflected in the GCI methodology since 2019, but the content of their work is a part of both the GCI and the RCI. Besides questionnaires measuring the quality of education, labour market data and international education surveys, especially when looking at the GCI, attention should also be paid to the availability of an adequate supply of teachers. In the case of primary education, the shortage of primary education teachers in Hungary is currently less evident, but by 2030 it will be seriously definite, and will have a direct impact on the medium-term competitiveness of the economy.

The following Eurostat data show the change in numbers of primary education teachers in Hungary since 2013. [7] [8]

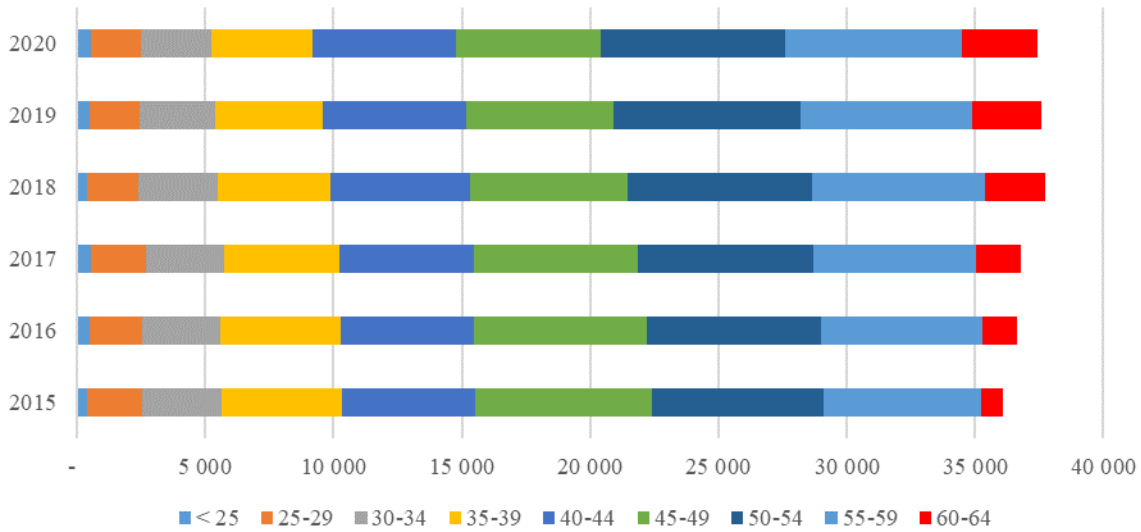


Figure 7 Number of primary education teachers by age groups (2013-2020)
 Data source: [7] [8]

The number of primary education teachers under 25 is very low, and their number aged 25-29 has declined moderately, as the entry age is being replaced by a lower number of new teachers. The 45-49 and 50-54 age groups have similar proportions, but when looking at the year-on-year changes in the age structure, we see that there is an increasing proportion of 55 and over 60-year-olds. The slow shift to the age groups 45-49 and 50-54 in the graph shows that the age profile of primary education teachers has increased significantly over 5 years at the national level.

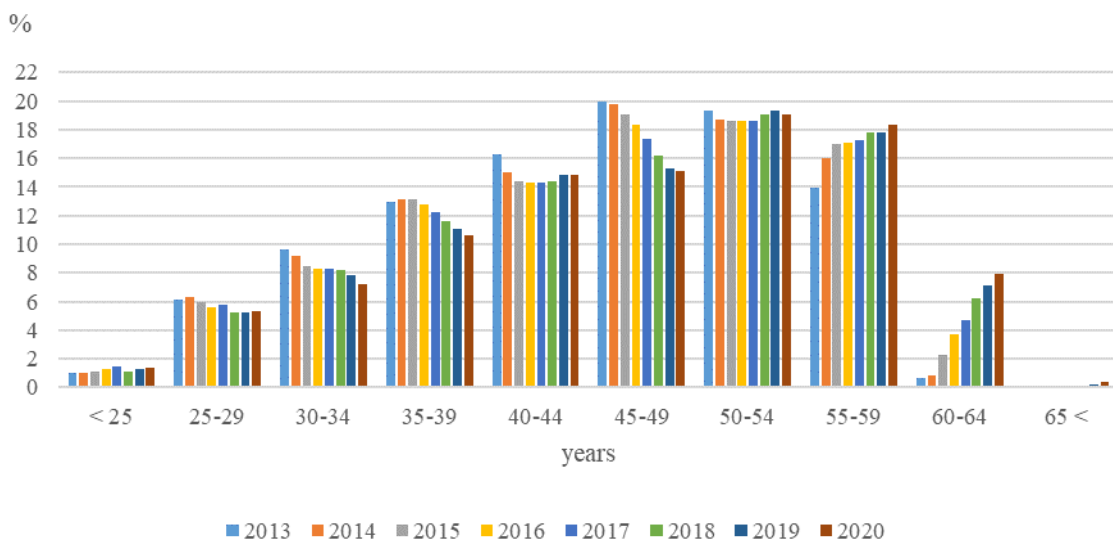


Figure 8 Ratio of teachers in primary education by age groups
 Data source: [7] [8]

Figure 10 illustrates exactly the problem with age structure. In 2013 and 2014, the proportion of freshly graduated primary education teachers, i.e., under 25, exceeded the group over 60,

the group affected by retirement. From 2015 to 2017, the proportion under 25 increased, but this increase could not catch up with that of teachers before retirement.

In addition to rates, a comparison of the number of teachers in each age group also highlights the problem. The age distribution is shifting towards older age groups. The number of people in age groups over 45 significantly exceeds the number in age groups under 45. For the 30-34 age group, a decline is seen after 2014, while the number of 25–29-year-olds has stagnated after a decline. The number of primary education teachers in the 35-39 age group is steadily decreasing, while their number in the 40-44 age group is increasing. The 45-49 age group is decreasing, and as they move into the next age group, the number of elements in this age group increases. Strong increases are seen in the 55-59 and 60-64 age groups. This also points to the ageing problem and a lack of sufficient replacement.

Comparing the proportion of primary education teachers under 30 and above 60, data shows that new ratio of age group under 30 was higher. There was a shift turn after 2018, and the ratio of primary education teachers above 60 has started to increase.

A further aspect of the problem is the decline in the number of teachers since 2019, meaning that the total sample size is also declining. Thus, within a smaller sample, the proportion of under-25s is decreasing while the proportion of over-60s is increasing, confirming the existence of an ageing problem of the profession endangering the stability of primary education system in Hungary.

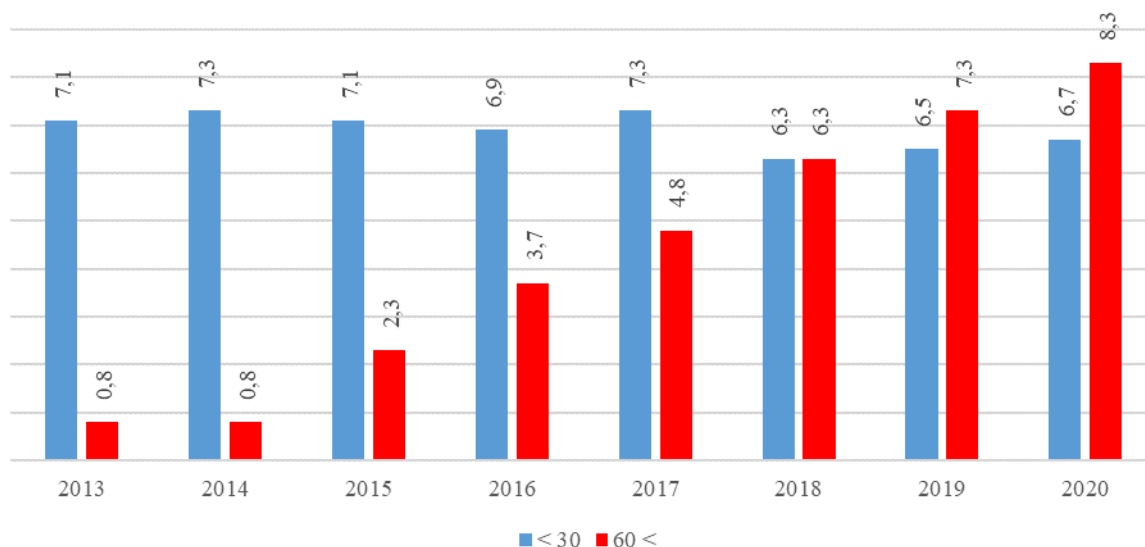


Figure 9 Ratio of teachers in primary education less than 30 and more than 60 years
 Source: author's calculation based on [7] [8] data sheets

In 2020, the entry requirements for primary teacher education have also been strengthened with the introduction of the advanced level school-leaving examination. Between 2013 and 2017, the number of admissions increased steadily from 899 to 1151 per year. In 2018, the increase slowed down, with only 1 086 applicants for teacher training. In 2019, this number increased to 1 115, but in 2020 it fell back to the pre-2010 level of 833 applicants. [10]

In the period 2013-2019, the increase in the number of enrolments has also had an impact on the increase in the number of graduates. The growth until 2019 will ensure higher numbers of graduates until 2023, but from 2024 onwards the numbers will fall to pre-2013 levels. Present trends show that the number of new students in primary teacher education will be stabilized

around 800. According to graduation data of Hungarian Educational Authority, the average dropout rate was 37% of those admitted in 2014 graduated in 2018. [11]

In the mind-term calculation, it will provide around 500 freshly graduated in every year.

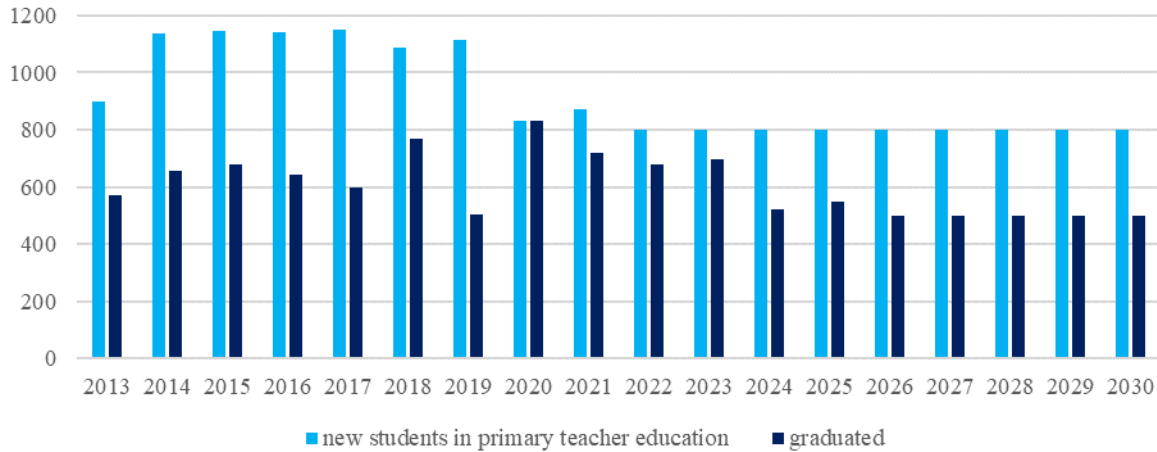


Figure 10 Number of new students and graduates (2013-2030)
 Source: author's calculation based on [10] [11] data sheets

Unfortunately, those who chose other profession after graduation is quite high considering the difference between graduated and the change of the numbers of primary education teachers. The freshly graduated cannot provide the supply of the retired and of those who leave teaching profession since 2019.

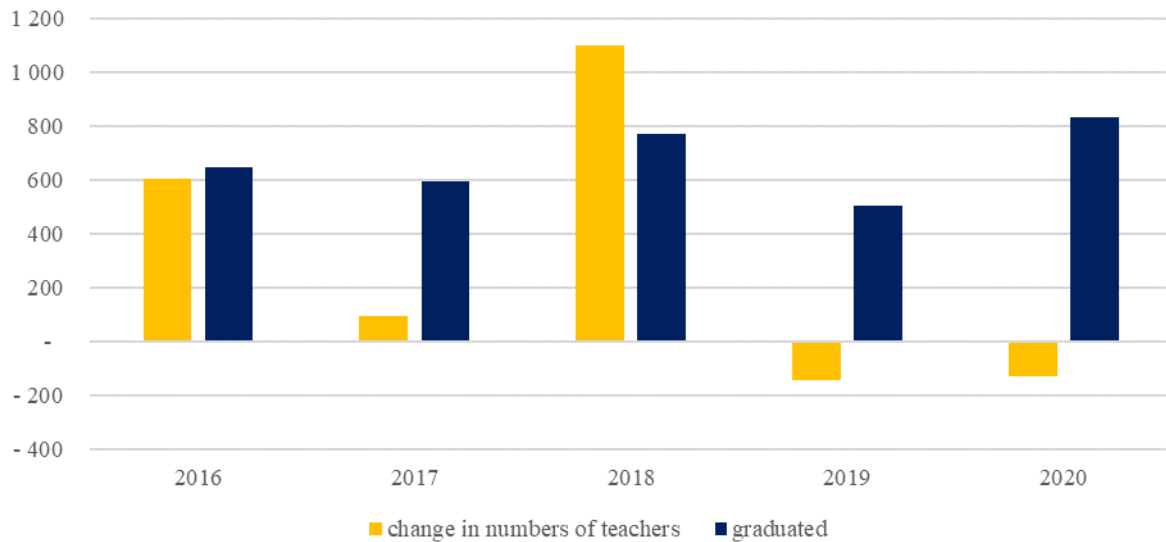


Figure 11 Number of graduated and the change in numbers of primary education teachers
 Source: author's calculation based on [7] [8] [10] [11] data sheets

Combining the current demographic decline in the number of primary education teachers since 2017 with the drop in the number of graduates from 2024 to pre-2013 levels, it is predicted that higher education will not be able to provide adequate supply the replacement the retiring teachers.

Assuming that all the graduates will work as primary education teachers and there will not be any active teachers who leave profession, and calculating with the average 37% dropout rate in primary teacher education, the number of primary education teachers will reduce by 4500 (from 37,500 to 33,000) for the end of the decade.

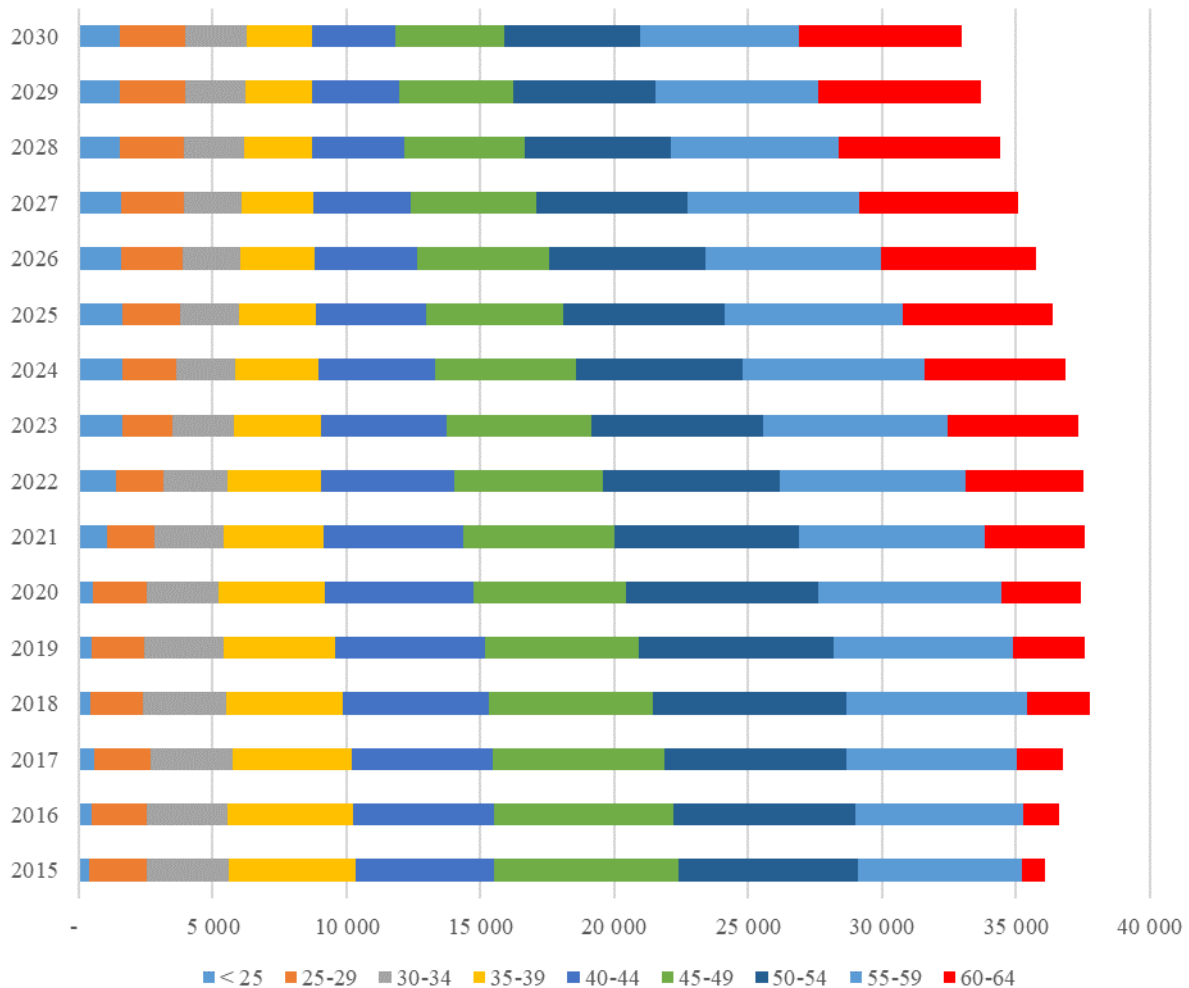


Figure 12 Number of teachers in primary education by age groups till 2030
 Source: author's calculation based on [7] [8] [10] [11] data sheets

After 2023, the total number of primary education teachers will start to decrease meanwhile the number of teachers above 60 increases steadily. Figure 14 shows that the age pyramid is shifting towards the older, near-retirement age group, with fewer and fewer people under 45. This phenomenon heavily endangers the stability of primary education in Hungary.

Conclusions

The Lisbon Strategy finds the competitiveness of the EU and its Member States in dynamic knowledge-based economy and labour force that meets economic need. The effects of lifelong learning can be measured in concrete economic impacts, as applied methodology of competitiveness indicators shows. The Global Competitiveness Index or the EU Regional Competitiveness Index measures the performance of primary education in relation to the development of human capital as one of the factors influencing the competitiveness of the economy.

The qualitative and quantitative indicators for primary education are mixed, but in each case the role of teachers is indisputable. Quality indicators are influenced not only by the knowledge and qualifications of the teacher but also by the national curriculum. Sub-indicators based on statistical data or international surveys (PISA, TIMSS and PIRLS) are clear performance indicators. In the field of education, Hungary does not show outstanding results in these indicators, which influences the skills and adaptability of the future workforce. This problem in primary education is also highlighted in the Competitiveness Report 2021 of the Hungarian National Bank.

The number of teachers is a factor influencing competitiveness, which will present serious problems for primary education in this decade. In addition to the ageing of the primary education teaching professionals, low wages are a further problem, as they do not motivate new graduates to work in the profession or to apply teacher training. The problem is serious. Based on recent trends, mid-term calculation presented in this study predicts the decline of primary education teachers by 4500 for the end of the decade.

How could higher education institutions provide enough supply, how could they influence the numbers of primary education teachers. According to press releases, new entry requirement from the Autumn of 2024 will provide more flexible higher education environment where higher education institution could determine their own entry requirements (like before 2006) and could decide over language requirements of graduation as well. [9] The future text of the new government regulation will give options for HEIs to make primary education teaching as a profession more attractive for applicants. However, lowering entry requirements could cause serious drop in the quality of the graduates that directly effects on pupils' achievements that future PISA, TIMSS and PIRLS tests results will show.

Quality and quantity are also questions in the field of primary education teacher training, however HEIs are few to have significant impact on the supply side. Teachers' wage problem will determine the future of the profession independently from the efforts of higher education institution and the future competitiveness of the national economy.

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