Czech University of Life Sciences Prague

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Diploma Thesis

Comparison of Selected Educational Systems Within the EU

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DIPLOMA THESIS ASSIGNMENT

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European Agrarian Diplomacy

Thesis title

Comparison of Selected Educational Systems Within the EU

Objectives of thesis

The main objective of this diploma thesis is to analyze the relationship between the expenditure on education and unemployment rate of graduates in the selected EU countries and to provide a comprehensive overview of the selected educational systems. Moreover, the main objective is accompanied by the following partial goals. The trend analysis of expenditure on education as the percentage of GDP and estimation of its future values. Another partial goal is the comparison of selected countries based on the results of the international student assessment, the PISA score, the expenditure on education per student and by the key issues of each selected educational system.

Methodology

In the compliance with the objectives of the diploma thesis, descriptive and comparative methods are used together with the time series and trend analysis, regression and statistical hypothesis.

In the first part, the theoretical background of the educational systems, macroeconomic notions, and the international recognition of education is gathered by the research of secondary data sources, professional books, internet publications and web articles from the credible sources.

The practical part contains mainly qualitative and quantitative techniques. For expenditure on education as the percentage of GDP and prediction of its future values, the trend analysis is used. Furthermore, the regression is used for the analysis of the relationship between expenditure on education and the unemployment rate.

The proposed extent of the thesis

60-80 pages

Keywords

Analysis, comparison ,economic growth, education, European Union, expeditures, GDP, PISA, school systems

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Recommended information sources

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Declaration

I declare that I have worked on my diploma thesis titled "Comparison of Selected Educational Systems Within the EU" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the diploma thesis, I declare that the thesis does not break copyrights of any their person.

In Prague on 28.03.2018 _____

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I would like to thank to my supervisor Ing. Irena Benešová, Ph.D. for guiding me throught my thesis. For her recommendation, patience and valuable advices.

Comparison of Selected Educational Systems Within the EU

Abstract

The main aim of this diploma thesis is to compare the educational systems of selected member countries in the EU and to describe the current problems faced by individual countries with reference to education.

In the theoretical part are described individual elements that are directly or indirectly related to education. Indicators such as GDP, unemployment, the theory of economic growth and the role of education in economic growth are described in this part. Here is also a section devoted to the European Union. Datas as history, enlargement and European Union education programs. The last part is devoted to the Programme for International Student Assessment – PISA.

Another part of the diploma thesis is devoted to description of individual school systems of selected countries. States were elected in such a way that half of them are from the founding member states of the EU or the states accepted soon after their establishment. The second half are the new member states, accepted after 2004. The practical part then describes the country's government spending on education by using secondary data and contains a trend analysis showing the expenditure on education expressed as a percentage of the country's GDP.

Countries with the most complex education systems showed also best results in PISA. UK, Netherlands and Poland spend the highest share of their GDP on education, in general, old member countries have better educational outcomes than the new members. Moreover, the dependency of unemployment on expenditure on education was found only for Germany.

Keywords: analysis, comparison, economic growth, education, European Union, expediture, GDP, PISA, school systems

Porovnání vybraných vzdělávacích systémů v Evropské Unii

Abstrakt

Hlavním cílem této diplomové práce je porovnání školských systémů vybraných členských zemí v Evropské Unii a popsání současných problémů kterým jednotlivé státy, s odkazem na vzdělávání, čelí.

V teoretické části jsou popsány jednotlivé prvky, které přímo či nepřímo se vzděláváním souvisejí. Jsou zde popsány ukazatelé jako HDP, nezaměstnanost, teorie ekonomického růstu a role vzdělávání na ekonomický růst. Dále je zde část, věnována Evropské Unii. Je zde uvedena historie, rozšiřování a programy Evropské Unie spojené se vzděláváním. Poslední část je věnována Programu pro mezinárodní hodnocení studentů – PISA.

Další část diplomové práce je věnována popisu jednotlivých školských systémů vybraných zemí. Státy byly zvoleny tak, aby polovina z nich byla ze států zakládajích Evropskou Unii, či států připojených brzy po založení. Druhá polovina jsou státy novější, připojené nedávno v zohlednění rozšiřování Evropské Unie. Praktická část pak popisuje pomocí sekundárních dat vládní výdaje dané země na vzdělání a obsahuje trendovou analýzu zobrazující výdaje na vzdělání vyjádřené jako procentuální část HDP dané země.

Země s nejvíce komplexními systémy školství prokázaly rovněž nejlepší výsledky v PISA testování. Spojené království, Nizozemsko a Polsko jsou země s největšími výdaji na vzdělání ku HDP. Obecně se dá říci, že staré členské země vykazují lepší výsledky ve vzdělávání, než země nově přijaté. Závislost nezaměstnanosti na vládních výdajích na vzdělání by dále nalezena pouze v případě Německa.

Klíčová slova: analýza, ekonomický růst, Evropská Unie, HDP, PISA, porovnání, školní systémy, vzdělávání, výdaje

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List of Abbreviations

EU	European Union
PISA	Programme for International Student Assesment
GDP	Gross domestic product
ECTS	European Credit Transfer and Accumulation System
EHEA	European Higher Education Area
ISCED	International Standard Classification of Education
UNESCO	United Nations Educational, Scientific and Cultural Organization
OECD	Organisation for Economic Co-operation and Development

1 Introduction

Education has its unmistakable role in the modern world. Education has not always been a matter of course, as it can be seen today. Even in 21st century, in some countries education is not available for everyone, especially for women. In European Union the situation of education is more positive. For current member states at least basic school, corresponding with ISCED 1 and lower secondary education corresponding with ISCED 2, is obligatory. Illiteracy in Europe is low. According to CIA Factbook the lowest literacy rate in Europe was held by Portugal in 2011, with 95.4% of literacy rate. Also gender inequality in Europe is not so significant. Compulsory school attendance is obligatory for both genders.

Education and its role in society has been changing all the time. Education was experiencing its peaks and dampers. Although it may seem, that schools and education has been in human society across all ages, its shape has been changing all the time. In a historical context, where people were hunters and gatherers children were passively thought by their community and especially parents. Education was passed through imitation of elders. Children's curiosity is supposed to play an important role in acquiring knowledge. In traditional farming societies transfer of knowledge played an important role. Agricultural skills were passed from one generation to another. This shifted level of agriculture still a little bit more and more. Every new innovation was soon expanded for the rest of the community. Level of civilizations was different across continents, therefore traveling played also key role in education. Encounter with other cultures brought new insights and knowledge. With agricultural also came possibility to own the land and social hierarchy started to be bound to tangible goods. Ability to read and write was a highly valued ability, which was the privilege of rich people.

The need of compulsory school attendance came with transition to industrialization and with religious reformations. The idea of compulsory school attendance has been developing in Europe highly from 16th to 19th century. The opinion on what should be learned in schools differed according to own interests of individual countries. The key factor for creating of obligatory school attendance was the Protestant Church and Martin Luther. According to his reforms, the redemption depends on the own reading of the scripture and its understanding. Martin Luther and other reform leaders have claimed, that

public education should be a Christian duty. First European country with the obligatory school attendance was in protestant duchy in 1592 in the territory of today's Germany. On territory of the Czech Republic the first obligatory school attendance was in 1774 made by Maria Theresa.

Importance of education and human capital in general, has been first projected into a theories of economic growth in the mid-1980s. For group of growth theorists, the theories based on exogenous factors became insufficient. Instead of technical progress, attention was focused on human capital as a factor for economic growth. Those theories and many other researches strengthened the position of education in the developed world.

For irreplaceable function of education and its significant importance this diploma thesis is devoted to education and description of individual schooling systems within the European Union.

2 Objectives and Methodology

2.1 Objectives

The main objective of this diploma thesis is to provide a comprehensive comparison of education systems of selected EU countries. Moreover, several interconnected partial goals have been defined within the main objective.

Primarily, the thesis put emphasis on delivering the complex description of selected education systems. Second partial goal is to provide the trend analysis of expenditure on education of selected EU countries and estimation of its future values. Furthermore, based on the trend analysis, find out the dependency between unemployment and expenditure on education. Another partial goal is to highlight the specific problematics of each selected education systems together with country's international performance in the Programme for International Student Assessment (PISA).

2.2 Research Question

In the context of the main objective, this diploma thesis aims to answer the following research question.

- Can be found a significant dependency between the expenditure on education and unemployment in selected EU countries?

2.3 Methodology

The theoretical part provides important data for illustrating the overall image of the aim of this diploma thesis. The theoretical part is based on secondary data sources as scientific articles or documents, research reports from organisation dealing with education, books or competent web pages. In the theoretical part the concepts directly or indirectly connected with education are listed.

The practical part is divided into two main sectors. The first one is dealing with the specifics of education systems of selected countries. For this part of research, eight countries, which are the members of European Union, have been selected. Countries have been chosen to represent the *old* and *new* member states of the European Union. For the representation of the *old* member states, four countries have been selected. Those are the founding states of the European Union as Netherland, Italy and Germany. This group also includes Great Britain which has been accepted in during first enlargement. A *new* member states are represented in this thesis by the countries accepted after the year 2004. The Czech Republic and Poland from fifth enlargement. Romania from the sixth enlargement and by the Croatia represented by the latest enlargement. In this part the practical education systems of selected countries are described, based on the scientific articles from international organisations or official documents made by the chosen country. This part is also completed by the figures showing the system of selected country including the ISCED (International Standard Classification of Education) levels, for better clarity.

The second part of the practical chapter is dedicated to the research of the governmental expenditure on education expressed as the percentage of GDP. All data are obtained from World Bank and European Commission for time period between 1992 and 2015. The descriptive analysis is used also to describe the current problems connected to education occurring in the selected countries. Problems are described based on European Commission's monitoring reports. Moreover, the trend analysis used is used to predict future values of government expenditure on education. Future values of expenditure on education are estimated by the forecast function of MS Excel 2016. This function uses the method of exponential triple smoothing and takes into consideration trends and seasonality. If needed, the forecast function of MS Excel 2016 use method of interpolation to fill the missing values in analysed time series.

Furthermore, the simple linear regression as the model with one dependent variable and one independent variable is used for finding the dependency of unemployment in the country on governmental expenditure on education. The data for expenditure on education are obtained from World Bank and for unemployment are from Eurostat. MS Excel 2016 is used as the statistical tool to provide the regression analysis.

2.4 Research Limitation

The research provided by this diploma thesis is limited by numerous factors. The bias in the research can occur due to selected educational indicator, as the problematics of education in selected countries is more complex. Furthermore, the thesis deals with the data sample from 1992 to 2015, although, for most of the observed countries, the dataset is incomplete and therefore, in some cases it is not possible to obtain the trend analysis and prediction of future values of expenditure on education, or the dataset has been significantly reduced to be able to provide the simple linear regression. Due to these facts, it is possible the results could be biased. Furthermore, due to the scope of the thesis only basic statistical methods are used.

3 Literature Review

3.1 Gross Domestic Product (GDP)

GDP is used as an index for measuring of economic performance of state. According to World bank, GDP represents the market value of all final goods and services produced within a country's borders, during the course of one year. It is important index even in comparison of economic maturity of individual states and it is showing if the economy is growing or contracting. It provides a measure of the monetary value of the goods and services that country produces in a specific year. (Investopedia, 2018) In measuring of GDP, values as GDP nominal and real GDP, must be distinguish, according to the method of their valuation.

Nominal GDP is measured at the prices prevailing in the period during which outputs are produced. Real GDP is measured at the constant prices; therefore, it is not including inflation. Increase in real GDP implies an estimate of the real of physical changes in production or outputs between any specified years. GDP per capita shows the value of outputs by the size of the population. As a calculation nominal GDP is divided by population. (Dornbusch and Fischer, 1994)

GDP can be measured by three different calculation methods:

- **The production approach** it is based on the value of manufactured goods and services over a certain period. It is necessary to exclude intermediate products from the total sum of manufactured goods. It can be difficult to differentiate between intermediate and final goods, that is why some countries prefer other methods.
- **The income approach** is calculated as a sum of all the incomes that the production factors acquire for certain services over a certain period.
  GDP = wages + salaries + rents + interest + profits
  Included should be only primary earnings of production, not transfer payments. Using a transfer payment for calculation would cause double counting which would be over-estimation of total production.
- **The expenditure approach** is the most used methods. It is based on expenditure structure.

GDP = consumption + investment expenditure of companies + state expenditure of goods and services + net exports (difference between exports and imports) (Dornbusch and Fischer, 1994).

3.2 Theories of Economic Growth

Theories of economic growth can by described on many different models. The main theories include: Mercantilism, Classical theory, Neo-classical theory, Endogenous growth theories, Keynesian demand-side and Limits to growth theory.

Endogenous growth theory is opposite for exogenous growth theories. Endogenous growth theories are based on theory, that economic growth is not primary caused by external forces. How it was claimed in previous theories. For endogenous growth theory the most important factors are human capital, innovation and knowledge. According to endogenous growth theory education is important investment for economic growth. Policy measures are stated as a factor for long run growth rate. Education, research and development is an important factor for this theory. The model with endogenous variables started to be used in the mid-1980s. In neo-classical growth theories the long-run growth was determined by saving rates or rate of technical progress. (Cessarato, 2008)

The first version of endogenous growth theory was AK theory, which was made by Frankel in 1962. Endogenous theory is used for explanation of advantages which have industrialised countries against non-industrial countries. (Business Dictionary, 2018)

3.2.1 The Role of Education in Economic Growth

The interconnection between education and economic growth has been the subject of many research. The level of education in developing countries is very different than in developed countries. (Hanushek and Wößmann, 2007) After publishing of research of authors as Barro (1991), Mankiw, Romer and Weil (1992) the many scientific articles has been published about the directive research connection economic growth and education. Inspired by all those reaches, United Nation and the Millennium Development Goal decided to give a significance for an education in aim to reach a better economic growth especially for developing countries. Education can be measured on quality and quantity level. Education quantity is usually measured by statistical indicators as schooling enrolment ratio, the average years of schooling, adult literacy rate, education spending.

Education quality can be measured as repetitions rate, student/teacher ratios, schooling life expectancy, test scores, trained teachers etc. In providing of education the government has really important role. Besides indicates the level of the quality of education by setting the salary level for teachers and requirements for their qualification.

The authors Hanushek et al. (1995, 2000,2007) made an extensive research connecting labour force quality and international mathematics and science scores. They proved that these factors are strongly related to economic growth. Lee and Barro (2001) shows, that for good educational outcomes, factors as small class size, increased schooling life expectancy and higher teacher salaries are important. (Cooray, 2009) Hanushek and Wößmann (2007) emphasize, that schooling systems are not the only factor projected into future working ability of students. Development of cognitive skills is created in formal schooling but also is influenced by the family background, by culture, classmates etc.

Therefore, in comparing of cognitive skills of youth in developing and developed countries the gaps can be significant. Research also shows connection between level of education and higher individual earnings. Governmental investments into education are also taken as a tool which has positive effect on criminality, fertility, health and better citizen participation in public life. Education in the country together has a preventive role and saves state resources for removing negative impacts in society. (Hanushek and Wößmann, 2007)

Education also improves the ability to understand information, processing information and then implement it in the assigned task. These skills are necessary to get and maintain job. Education also helps to keep pace with improvement of technologies, which are also one of the factors for economic growth. For sustainable economic growth it is important to learn and to follow and understand the new technological developments. Educated people are also more open to innovation, so the education speeds the process of technological diffusion. (Nelson and Phelps, 2011)

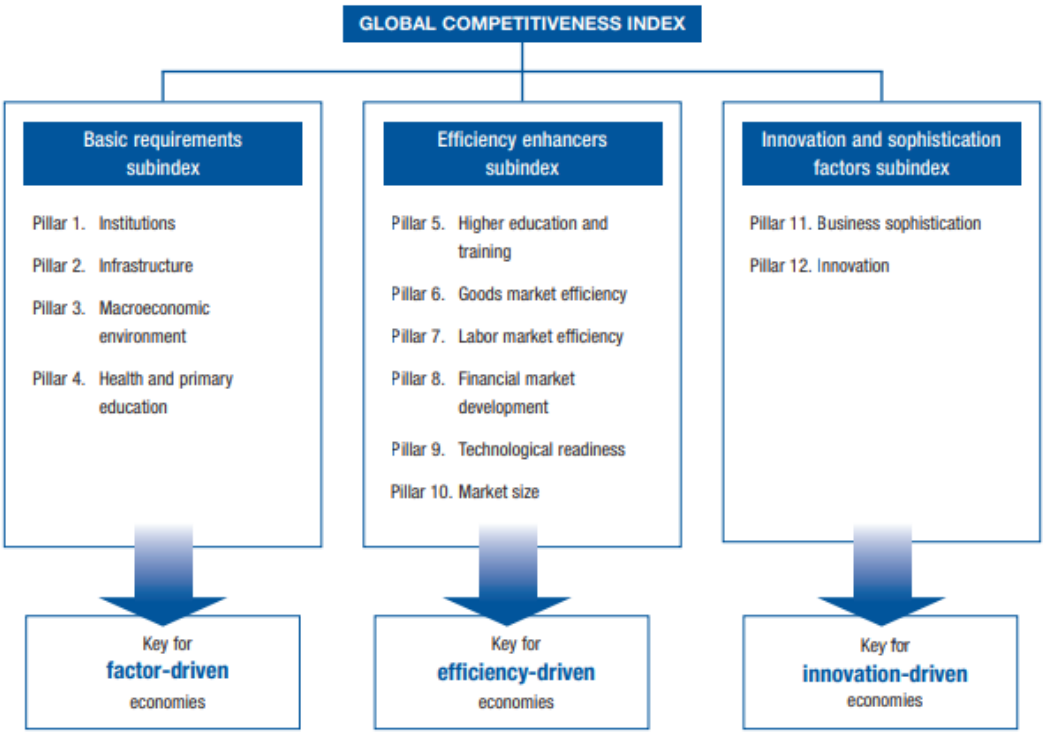
According to EDUin, we could highlight three ways how education influence economic growth as:

- Education increases the human capital of the workforce, increasing labour productivity and the equilibrium value of the production

- Education can increase the country's innovation capacity and support knowledge for modern technologies, products and processes that support growth
- Education facilitates the dissemination and transfer of necessary knowledge in society and helps the successful implementation of modern technologies, which again promotes economic growth (EDUin, 2011)

The relationship between education and economic growth shows annual report from the World Economic Forum, with name Global Competitiveness Report. The report is divided into three categories according to the maturity of the countries. The lowest stadium, called as factor-driven states, economic growth is predominantly created by natural resources and unskilled labour. The next stage is called as efficiency-driven states, which requires production of better quality products and more efficient production. The last stage is economics called as innovation-driven. Development of those countries is dependent on the creation of new and unique products that requires the most demanding manufacturing and innovation. (Schwab, 2017)

Figure 1: Global Competitiveness Index



Source: Schwab, 2017

The length of study and its impact on economic growth were also assessed. Extensive research was done by the authors Hanushek and Wößmann (2007). They examined the relationship between length of study and economic growth in 92 countries in period from 1960 to 2000. The result of the study was an assertion that each year of extra study is linked to increase of GDP per capita about 0.58%. (Hanushek and Wößmann, 2007)

In later research the indicator length of study was changed for the quality of education and it showed to be more accurate. In later researches the indicators as a PISA score are taken in account. Author Hanushek (2000) made a new research, with Dennis D. Kimko (2000) and instead the length of study they used comparing of results in PISA score compare to economic growth. They concluded that an increase of 47 point in mathematics in PISA by 47 points will increase annual GDP growth by one percentage. After this finding, emphasis was placed on mathematical skills. (Hanushek and Kimko, 2000)

3.3 Unemployment

According to Cambridge Dictionary the unemployment is defined as: The number of people who do not have a job that provides a money. In Eurostat unemployed person is defined as someone who is in productive age, able to work and is without the work during the reference week. As a tool for measuring of unemployment the term unemployment rate is used. Unemployment rate is defined by OECD as a number of unemployed people as a percentage of labour force, where the latter consist of the unemployed people plus those in paid of self-employed.

Unemployment can be distinguished on long-term unemployment, short-term unemployment. Statistics about unemployment are most often divided according to age, gender and level of education. Increasingly watched became youth unemployment rate. Especially in Greece, Spain and Italy where these values are high above average of youth unemployment rate established for EU (28 countries). In 2016, EU (28 countries) had 18,7% youth unemployment, in the same year for Greece it was 47,4% and for Italy 37,8%. In 2017 the same indicator for Spain was 38,7%. (OECD, 2018)

3.4 Basic Characteristics of European Union

The European Union is an economic and a political union. This union connects 28 countries, although the number of member countries is going to decrease to 27 because Great Britain voted to leave in a so-called Brexit referendum held in 2016. Creating of the European Union was a crucial decision which raised Europe to be more significant internationally. Perception of Europe as a unit contributes to the competitiveness of all member states. (Eur-lex.europa.eu, 2010)

3.4.1 History

The situation in Europe after the Second World War required some stabilization solution. Therefore in 1951 European Coal and Steel Community has been created by signing Treaty of Paris. The Treaty was signed by Italy, Germany, France, Belgium, the Netherlands and Luxembourg. The aim of organisation was free movement of coal and steel within the territory of the member states and also free access to sources of production. (Eur-lex.europa.eu, 2010)

Later, representatives of those significant European countries have seen stabilization potential in the idea of economic cooperation. This idea should have brought the economic independence of the member states and lead to prevention of another conflict. The result of their negotiation was the European Economic Community, established in 1958 by Treaty of Rome. Alongside with the European Atomic Energy Community (EURATOM).

European Economic Community was initially economic cooperation between 6 states. Those countries were original member states, France, Italy, Germany, Belgium, Luxembourg and the Netherlands. Over the time other 22 states has been accepted. Member states together created significant single market. As the name suggests, European Economic Community was established mainly as a purely economic union. Union has evolved into more widespread policy area and the name European Economic Community has changed to more accurate name, European Union by Treaty of Maastricht. (Europa.eu, 2017)

3.4.2 Enlargement

As mentioned above, the six European countries, Germany, France, Italy, Belgium, the Netherlands and Luxembourg established the European Coal and Steel Community in 1951. Those countries created together European Economic Community and also European Atomic Energy Community in 1958. The first enlargement came in 1973, during so-called northern enlargement. Those new-coming countries were the United Kingdom, Ireland and Denmark.

Enlargement process continued in the 1980s by the accepting of three southern countries. Greece in 1981 and Portugal and Spain in 1986. All three southern enlargements were influenced by the change of political regimes in those countries and joining the Community was a way how to secure newly created democracies. In the year 1995, Austria and two northern countries, Sweden and Finland have been accepted to the newly formed the European Union.

The yet biggest enlargement occurred in 2004 when 10 former predominantly communist countries have joined the EU. Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia have joined the club. Furthermore, other two eastern countries have joined the EU in 2007, Romania and Bulgaria. The last country which has become a member was Croatia in 2013. (Europa.eu, 2017)

3.4.3 The European Union and Education

One of the European Union's principle is the existence of the common market. The members of the Union have the advantage of free movement of labour, goods, services and capital. It gives EU citizens right to study in other member states. (Europa.eu, 2017)

One of the most significant programs supporting education in the EU is the Erasmus+ program which was made for period 2014-2020. Fields of Erasmus+ programme are education, training, youth and sport. The programme is mostly made to help to mitigate socio-economic changes. And support European policy agenda for growth, jobs, equity and social inclusion. Decrease number of unemployment, especially for young people, is another future challenge which should be mitigated by provided education. Erasmus+ relate to EU member state countries and also countries of European Free Trade Area such as Norway, Lichtenstein and Iceland. In the programme is involved also Turkey and

country which is a member of European Economic Area, Switzerland. All involved countries outside EU have specific conditions. (Europa.eu, 2017)

The educational and training system of the EU member states is in the competence of individual states. The European Union does not interfere with these matters. The European Union only helps to set joint goals to share good practices. (Europa.eu, 2017) Also, education received in one of the member states should be valid in other EU member states. The exception have professions which have some regulation. Those professions are determinated by a particular member state. In each EU country, workers are required to obtain special qualifications or specific job titles to perform regulated professions. (Europa.eu, 2017)

Another significant issue, influencing education not only in European Union, but in whole Europe is the Bologna Process. The Bologna Process is a term expressing ministerial meetings and agreements between European countries. The Process was initiated by signing of the Bologna Declaration in 1999. Since then, every two years, there are meetings of ministers of education of participating countries (ministerial conferences), that aim to present a more comparable, coherent, and compatible system of European higher education (Eur-Lex, 2015, Europa.eu, 2018). As mentioned above, the Bologna Declaration was signed in the year 1999, by 29 countries. In 2018, there are already 48 signatory countries (Bologna Follow-Up Group) and the European Commission participating in the Bologna Process (EHEA, 2018). The Council of Europe (2014) points out the main objectives of the Bologna Declaration:

- Adoption of a system of easily readable and comparable degrees;
- Adoption of a system essentially based on two main cycles (undergraduate and graduate);
- Establishment of credit system – ECTS
- Promotion of mobility – free movement of students, teachers, researchers and administrative staff;
- Promotion of European co-operation in quality assurance;
- Promotion of the necessary European dimensions of higher education

After the Declaration the Bologna Follow-Up Group was formed, and the first ministerial meeting was held in Prague in 2001. The next ministerial meeting is scheduled

to take place in France in 2018. Another important term connected to the Bologna Process is the European Higher Education Area (EHEA). EHEA was officially launched in 2010 during the Budapest / Vienna ministerial conference and means the completing of the common European framework of higher education (EHEA, 2018). In other words, the European Higher Education Area includes all countries and institutions participating in the Bologna Process.

Besides Bologna Process, European education is influenced by the the International Standard Classification of Education (ISCED). ISCED was first developed by UNESCO in the 1970s to better cross-national comparison of education around the world. ISCED proposes sound criteria for the allocation of education programs to comparable levels. ISCED has been several times revised since 1970s. First revision came in 1997, and further review was undertaken between 2009 and 2011. (Eurostat, 2016). The revision in 2011 was focused especially on changes to the levels of education (ISCED-P) and introduced a classification of level of educational attainment (ISCED-A). Latest revision was in 2013 and was concentrated on the fields of education and training (ISCED-F) (UNESCO, 2015). List of levels of education according to the ISCED 2011 is following (Eurostat, 2016):

- ISCED 0: Early childhood education (less than primary)
- ISCED 1: Primary education
- ISCED 2: Lower secondary education
- ISCED 3: Upper secondary education
- ISCED 4: Post-secondary non-tertiary education
- ISCED 5: Short cycle tertiary education
- ISCED 6: Bachelor’s or equivalent level
- ISCED 7: Master’s or equivalent level
- ISCED 8: Doctoral or equivalent level

3.5 Programme for International Student Assessment

The Programme for International Student Assessment, shortly PISA was initiated by Organisation for Economic Co-operation and Development (OECD). PISA compares educational system worldwide, by comparing results from tests, testing skills and knowledges of 15 years old students. Test are made by educational experts from all the world. Program has begun in year 2000.

Pupils skills are tested in fields as science, reading, mathematics, collaborative problem solving and financial literacy. Test itself takes 2 hours and PISA results are announces every 3 years. The main aim of PISA testing is not only about shoving which country has the best results, but also it should be useful feedback for participation countries how to prepare their students for the further studies and in which field teaching is the most effective. (OECD, 2018) The last testing was in 2015 and the results were published on 6th December 2016. In 2015 were participating over half a million students, representing 72 countries. For year 2015 the highest PISA score had Canada, Finland, Japan and Estonia. The best result in science had Singapore. (OECD, 2018)

Table 1: 2015 PISA Score for the Observed EU Countries

Country	**Score in Science**	**Score in Reading**	**Score in Mathematics**
OECD average	*493*	*493*	*490*
Czech Republic	493	487	492
Poland	501	506	504
Croatia	475	487	464
Romania	435	434	444
Germany	509	509	506
United Kingdom	509	498	492
Italy	481	485	490
Netherlands	509	503	512

Source: OECD, 2018

4 Comparison of Education Systems of Selected EU Countries

In this chapter, different education systems of selected countries are described. To be more specific, systems of four *new* member countries, Czech Republic, Poland, Croatia, Romania and four *old* member countries, Germany, Italy, the Netherlands and United Kingdom are described. Each country has its own specifics which influence the educational output of the country in the international comparison.

4.1 Education System in the Czech Republic

As is visible in Figure 2, for the children under age of 3 years there is nursery, in Czech Jesle. Pre-school education generally starts at the age of 3, when children can be placed in the kindergarten (*Mateřská škola*). Kindergartens are not obligatory until age of five, but it is beneficial for children to be placed in the kindergarten because children can get the basic social behaviour. With simple tasks like drawing, dancing, singing or playing games, they are preparing for compulsory school attendance. For better preparation for compulsory school attendance, since September 2017, obligatory attendance of Kindergarten from children older than age of 5, has been enacted. (ČOSIV, 2017) According to OECD PISA score results those children, who visited at least one year of kindergarten before going to obligatory basic school had their peers who were not visiting kindergarten. Pre-school education can be given to the context with the better results in advanced age. (Czech Ministry of Education, Youth and Sport, 2015) In kindergarten children can stay approximately until the age of 6.

Obligatory is school attendance from 6 until the age of 15 when basic school is standardly finished. Basic school (*Základní škola*) is divided into two stages. The first stage of basic school is dedicated to children from 6 to 11. The first stage is provided only by basic schools. The second stage, which is for children who successfully finished the first level, is from 11 to 15 years. The second stage of basic education can be fulfilled in basic schools or by completion of a lower level of a grammar school (*Gymnázium*). Finished can be also on schools targeting for artistically oriented children (*Konzervatoř*). The law also allows completing of education in domestic conditions without the everyday

attendance of school. This type of education has its own specific features given by the law. (Czech Ministry of Education, Youth and Sport, 2012)

Although secondary education is not obligatory, the majority of student use this opportunity. Having only basic education leads to a significant disadvantage in the labour market. For acceptance to the secondary education, it is necessary to have completed basic education and accomplish the admission procedure established by the individual institution. A form of secondary education can be daily, night school, distance learning or combined studies. Secondary education programmes differ by length, difficulty and specialization.

The first type is secondary education ended by final examination called *Maturita*. This type of schooling takes 4 years of daily studying or can be done by absolving of the multiannual grammar school (*gymnázium*). In the end, the final examination is taken, which serve simultaneously as a confirmation of educational attainment. (National Training Fund, o.p.s., 2006)

The second type of secondary education is ended with a vocational certificate (*výuční list*). This type of education is more focused on the practical and manual activity. Absolving takes two or three years of studying and absolvents will get as a confirmation about fulfilment vocational certificate. In those types of institutions, there is a better claim to practice according to the chosen field. For continuing to higher education, *Maturita* exam is necessary. Students with a vocational certificate can take the extension study (*nástavbové studium*) which take another two years of study. Extension study is ended with *Maturita* examination.

Secondary education is determined even for children with special educational needs. This type of study takes one or two years of study in daily form.

The last category in secondary education is art secondary schools called *Konzervatoř*. *Konzervatoř* is possible to study from age of 11 as a part of the second level of basic school and continue until the age of 17. Or it is possible to choose *konzervatoř* as a secondary school from age of 15 until the age of 19. *Konzervatoř* offers fields of study such as dance, music, art or singing. *Konzervatoř* is completed by *Maturita* exam or with proof of completion called Absolutorium. (National Training Fund, o.p.s., 2006)

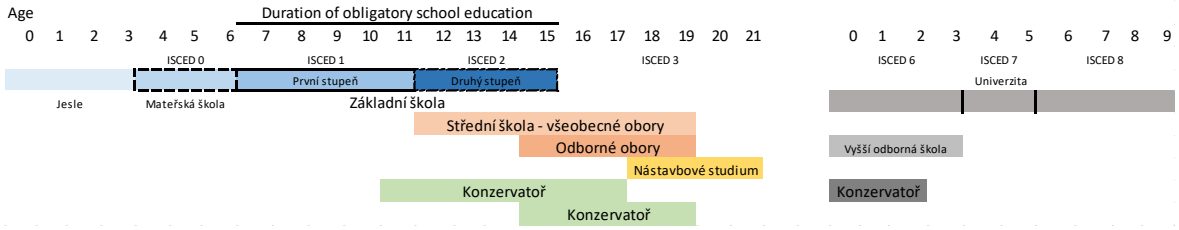
4.1.1 Higher Education

Higher education is designed for people with completed secondary education with final *Maturita* exam. After secondary education, there are two options to continue to University (*Univerzita*) or to Higher vocational school (*Vyšší odborná škola*). Entire system is closely displayed in Figure 2.

Higher vocational school is dedicated to deepening of knowledge and practice for the future profession. After absolving student will get title Certified specialist (DiS.), which is not equal to the academical title Bachelor. This type of stadium takes 3 or 3,5 years of studying, including practice. In the end, there is a final exam called Absolutorium. School commission is also evaluating thesis made by the student.

Studying on the university level is consistent with Bologna declaration. University studying has three levels. Bachelor, Master and Doctoral. Bachelor level takes 3 or 4 years of study and in the end, academic title Bachelor (Bc.) is awarded. The student must vindicate own bachelor thesis and be successful during the final state examination. Then he or she can continue to the upper level, master level. Master study takes usually 1 or 3 years and is made for deepening of knowledge. In the end, the student must vindicate own master thesis and be successful during the final state examination. After that academic title Master can be awarded. In the Czech Republic title has different form according to specialisation: Ing., Mgr., MgA., MUDr., MDDr. In case of study fields as medicine, pharmacy, pedagogy etc. studies can take 4 or 6 years. The last level is doctoral study. The study takes usually 3 or 4 years and it is intended to master level absolvents. This level is more focused to research activity and development. The study is again ended by final examination and defence of the thesis. After absolving academic title Ph.D is awarded. (National Training Fund, o.p.s., 2006; Czech Ministry of Education, Youth and Sport, 2012)

Figure 2: Education System in the Czech Republic



Source: Own elaboration based on Eurydice, 2016

Note: Explanation for the figure is given in the text

4.2 Education System in Poland

Poland is a large country, with the clearly given education system. All legal basis for Polish education is given by Constitution of the Republic of Poland. There is given that every person in Poland has the right to education. Education is obligatory until the age of 18 and on the public schools, education is free of charge.

For Polish education system, there are important two institutions, Ministry of National Education and the Ministry of Science and Higher Education. The education system is managed by these two institutions. (Eurydice, 2014)

For infants' nurseries (*Žłobek*) are determined. Infants can stay in the nursery until the age of 3. The nursery is not obligatory. After nursery for children in age 3 until 7 there is a Kindergarten (*Przedszkole*). Kindergarten is not obligatory until the age of 6. The last year in Kindergarten is obligatory and it is taken as a preparation for the primary school.

As is visible on Figure 3, children from 6 until the age of 16 have full-time, compulsory education. In this scale is included last year of the pre-primary education (*Przedszkole*) in the age of 6, which is also obligatory. Follows 6 years of primary education (*Szkoła podstawowa*) from age 7 until 13. primary education in Poland is free of charge. General education is divided into two stages. The first stage covers grades 1 to 3 and second stage covers grades 4 to six. In 2014, there were 13 443 primary schools and about 2.15 million pupils in Poland.

And the last sector which is full-time obligatory is three years in lower-secondary education (*Gimnazjum*). All those sectors are administrated by municipal authorities.

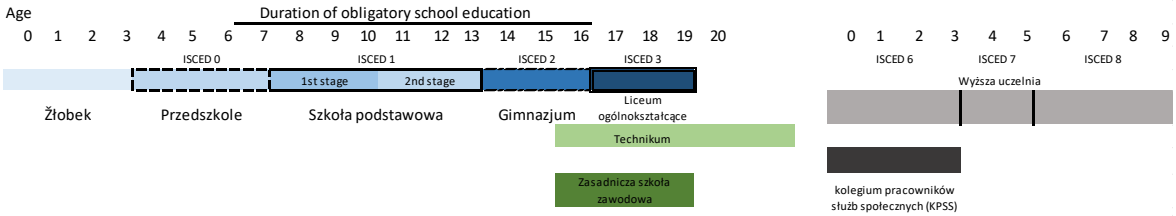
Following is a part-time compulsory education for youth age 17 until 18. In the year 2014, there were 7413 lower-secondary schools with 1124 students The *Gimnazjum* is then followed by non-compulsory Upper-secondary schools. Although non-compulsory, most of the population at the age of 16 to 20 attend the upper-secondary schools. Upper-secondary schools are divided into three groups and can be attended after the successful graduation from lower-secondary school. The first type is a three-year general upper-secondary school (*liceum ogólnokształcące*), the second type is a four-year technical upper-secondary school (*technikum*), and the third type is a three-year basic vocational school (*zasadnicza szkoła zawodowa*). (Eurydice, 2014; Nuffic, 2015)

4.2.1 Higher Education

In case of tertiary education, students who graduated from upper-secondary schools in Poland can choose between degree programmes and college programmes (wyższa uczelnia). Degree programmes are provided by public and private (non-public) institutions such as universities, or non-university institutions. These institutions offer bachelor's degree (first -cycle) and Master's degree (long-cycle) programmes. First-cycle programmes last 6 semesters and graduates obtain a degree (*licencjat*). Graduates from Master's degree programmes can develop their knowledge in specific fields by applying to third-cycle programmes, e.g. doctoral studies. Other options for holders of Bachelor's or Master's degrees are post-graduate programmes without obtaining any degree, usually for one or two years.

College programmes are provided by several institutions. Colleges of social work (*kolegium pracowników służb społecznych*), teacher training colleges (*kolegium nauczycielskie*) and colleges training foreign languages (n*auczycielskie kolegium języków obcych*). College programmes are part of tertiary education for international recognition but are not actually recognised as tertiary education on the national level (Eurydice, 2014). Since 2017 there is a big reform in education, which is further described in practical part of this diploma thesis. The system is closely showed in Figure 3.

Figure 3: Education System in Poland



Source: Own elaboration based on Eurydice, 2016

Note: Explanation for the figure is given in the text

4.3 Education system in Croatia

Croatian education system starts with kindergarten, in Croatian *Dječji vrtič*. This is not compulsory, but still widely used for its education and social character. Preschool education starts at age of only six months. Children can stay in kindergarten up to the age of seven. Preschool institutions are run by local authorities or are private. Kindergartens provide full-day or shorter education programs. They are responsible for health care, nutrition and social care of children. In 2010 preschool education was used by 58% of children in early age and 99% by children in an age before joining the primary education.

Children that are older than 6, between 6 and 7, have to attend primary school. Studying of primary schools is for free. Figure 4 shows, that primary school (*Osnovna škola*) is compulsory for 8 years, therefore children usually start at age of 6,5 and finish at the age of 15. For those, who failed to finish primary education, there is an adult education system. (Ministry of science, education and sport, 2017)

After finishing primary school, children can choose if they want to continue their studies. Studying at the secondary level of education is for free. There are three types of secondary education and are optional. It is possible to choose from three types of school, grammar schools (*Gimnazija*), vocational schools (*četverogodišnji/petogodišnji strukovni programi*) and art schools. Vocational schools are technicaly, industrially and craft-based. Students attend them from one to five years and in the end, they have to submit the final assignment. If they finish four years of studying on the secondary school it is possible to make state *matura* exam. Art schools usually provide majors such as dance, music and art.

The system is similar as in vocational schools, pupils can study from one to five years and they can finish with *matura* exam if they stay on the secondary level for four years. More usually they stay and finish with the final assignment. State *matura* is obligatory for continuation to higher education institutions. This was established in 2010. Studying on grammar school lasts four years and it is finished by *matura* state examination. In this case, a study has a more comprehensive syllabus. On secondary level there are also educational programs for adults and programs which will help to prepare people for their chosen vocation. (Croatia.eu, 2017; Ministry of science, education and sport, 2017)

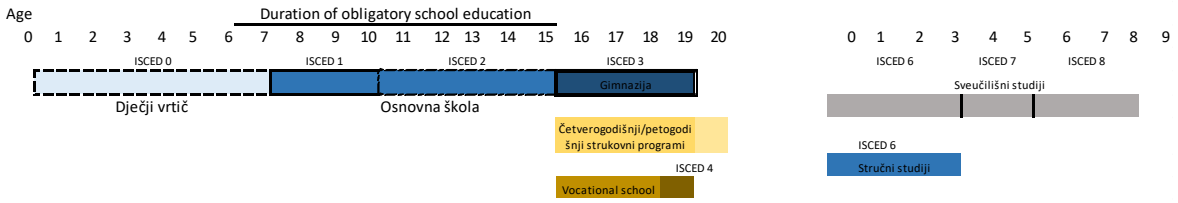
4.3.1 Higher education

Higher education is provided by universities (*sveučilišni studiji*) and professional studies (*stručni studiji*). In the category of higher education, it is possible to choose from polytechnics, colleges of applied sciences, faculties and art academies.

University studying has three degrees which can a student get. The first level is bachelor's degree, which can be awarded after finishing three or four years of studying. After finishing of bachelor degree students can continue to study on master level. The title Master can be awarded after one or two years of studying. The third level of the postgraduate studies last three years and it is ended by the defence of a doctoral dissertation. After successful defence academic title Doctor of Science or Doctor of Arts is assigned. Studying at the University is chosen by students who want to work in science, in the business world, in the academic environment or in the public sector.

Professional studies take two or three years. This type of study is provided by colleges of applied sciences, universities or polytechnics. This type of study is intended for people theirs work requires special professional knowledge in a specific field. This type of study provides sufficient knowledge and skills to their absolvents. Students after graduates are entitled as Professional Bachelor with reference to the specialization. Further, it is possible to get the academic title as Professional Specialist with reference to the specialization, after one or two years of studying on the polytechnics or colleges of applied sciences. This is intended for those who have completed professional study courses or undergraduate university courses. Also, universities may organise postgraduate specialist studies. It takes one or two years of study and it leads to the academic title University Specialist with reference to a specialization. (Croatia.eu, 2017) Whole system is described in Figure 4.

Figure 4: Education System in Croatia



Source: Own elaboration based on Eurydice, 2016

Note: Explanation for the figure is given in the text

4.4 Education System in Romania

Education in Romania is horizontally and vertically centralised. All responsibilities for education in the country has Ministry of National Education and Scientific Research (MNESR). The MNESR implement national policies to the local level with helping of Country School Inspectorates (CSIs).

In Romania children under age of three can be given to the nursery (*creşă*). From 3 to 6 children can be positioned in the kindergarten (*Grădiniţă*). Nursery and kindergarten are not compulsory. Kindergartens are private or public. Prices for private kindergarten are aiming to upper and upper-middle class families. For clarity everything is showed in Figure 5.

Education in Romania is compulsory for 11 years. Compulsory education starts from age 6 as a preparatory year in the primary school *(Şcoală primară*) and finishes at the age of 17, when a student is in the upper level of secondary education. Primary schools can be public or private. The most of them are public. From age of 11, there is lower secondary education until the age of 15 (*Gimnaziu*).

From the age of 15 there is a secondary school which has three types: technological (*Liceu filiera Technologică*), theoretical (*Liceu filiera Teoretică*) and vocational (*Liceu filiera Vocaţională*). Technological high school are a combination of academic and vocational programmes. Theoretical and vocational high school have an academic programme, but afterwards, they have some specialization on art, sport, theology, military.

All three types of secondary schools have the final examination at the end of study, baccalaureate. This exam is necessary if students wish to continue in a study on a higher level. On secondary school, only two years of study are obligatory, approximately until the age of 17. There is a possibility to stay voluntarily two years longer and finish study completely. For those, who want to specialize to a particular craft there is vocational education (Învăţământ professional). Studium takes three years. (OECD, 2017)

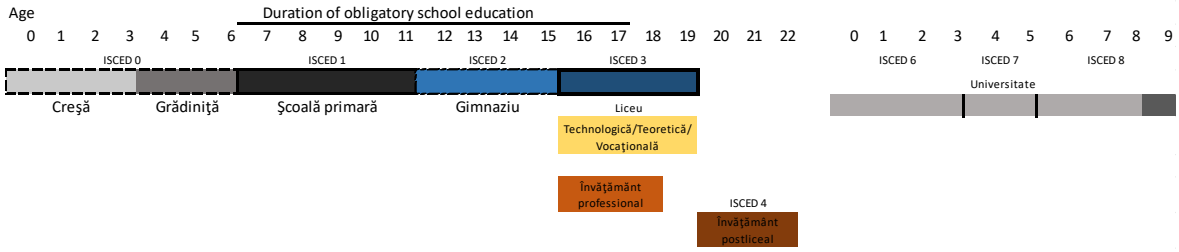
4.4.1 Higher Education

The higher level of education in Romania provides universities (Universitate), institutions, academies of study and post-university studies schools (Învăţământ postliceal). The higher education was established to provide education or education with research.

Studying at the university has three degrees. The first level is a bachelor's degree, the second level is a master's degree and the third level is a doctoral degree. The first level is designed usually as a three years program, the second level takes two years of study and the third level is for another three years. Length of study varies according to the field of study. For bachelor degree standard time of 3 years have fields of study as science, economic, social science, political science etc. Four years in the field of engineering and technique. And six years for medicine, dental medicine, veterinary medicine and architecture. For master's degree length of study is given by several obtained credits, but the maximal length is two years. A doctoral degree takes usually 3 or 4 years.

Application for higher education can give the only student who finished secondary school successfully and has a good score on final examination called baccalaureate. Universities are public and private, studying on the public university is for free and covered by the state budget. Romanian education system also provides lifelong learning programs for all age groups. (EuroEducation.net, 2018)

Figure 5: Education System in Romania



Source: Own elaboration based on Eurydice, 2016

Note: Explanation for the figure is given in the text

4.5 Education System in Italy

Figure 6 shows, that education in Italy is obligatory from 6 to approximately 15 or 16 years. In Italy, there are public and private institutions. Infants from 6 months until the age of 3 can be visiting the nursery, in Italian *Asilo nido*. From 3 until 6 years of age children can be placed in the kindergarten (*Scuola dell'infanzia*). Nursery and kindergarten are not obligatory. Obligatory is a primary school (*scuola primaria*), from age of 6 until 11. After finishing primary school, children continue to the first stage of secondary education (*scuola secondaria di primo grado).* This stage is from 11 until the age of 14.

After finishing this level, there is a second stage of the secondary school. Students must finish two years of the second stage of secondary school and they can finish or continue voluntarily in studying. Full length of study is five years. It is obligatory only from 14 to approximately 15/16 years. The second stage of secondary education has three types: *Lycée* system (*Liceo*), technical high school (*Istituto tecnico*) and vocational high schools (*Istituti professionali*). Students of *Lycée* have to choose specialization as classical studies, scientific studies, foreign languages, arts, dance and music, human science.

Students who choose the technical high school can specialise for the economic sector and their field of study can be: Administration, finance or marketing; or Tourism. Or technological sector as Mechanism, Transport and logistics; Electronics and Electric engineering; Computer Science and Telecommunication; Graphics and Communication; Chemistry, Materials and Biotechnology; Fashion System; Agriculture, Food processing

and Agro-industry; Construction, Environment and Territory. On vocational high schools (Istruzione e formazione professionale) is possible to study something from Service area as Agriculture and rural development; Enology, gastronomy and tourism promotion; Trade and Social health. Or something from Industrial and artisan area as Industrial production and craft or Maintenance and technical assistance (Nuffic.nl, 2016).

4.5.1 Higher Education

After finishing of the second stage of secondary education it is possible to continue a higher level. By this is understood in Italy study on University (*Università*) or two types of non-university higher education: High-level Arts and Music education institutions (*alta formazione artistica/musicale*) and Higher technical institutes (*Instituto tecnico superiore*). Universities in Italy are autonomous.

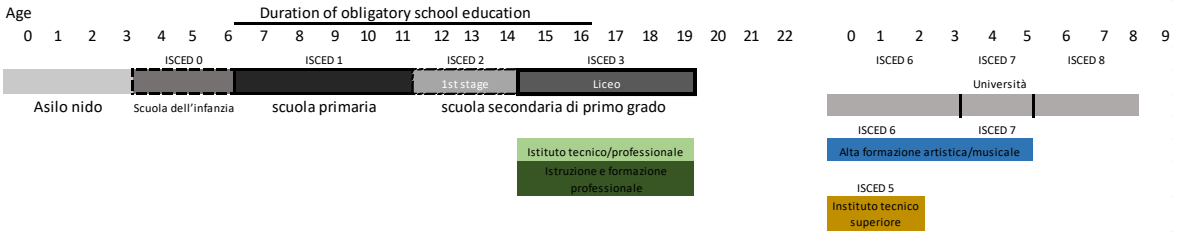
Universities have three levels, on first level students can get academic title Bachelor, on the second level can get academic title Master and on third level title Doctor. Students can advance to the higher level only if they fulfil all requirements for the lower level. Standard period for studying at bachelor level is 3 years, for master another 2 years and for doctor study usually 3 years.

Higher technical institutes were designed to cover Italian need for workers specialised in a technical field. Duration of the program is usually two years and after finishing is given non-university title *Diploma di tecnico superiore*.

High level Arts and Music education institutions offer education in the field as visual art, drama, dance, music or design.

Higher education includes possibility do get Specialisation diploma (*Diploma di specializzazione*). This kind of diploma is not equal to the bachelor diploma. Studying for Specialisation diploma is deepening of knowledge received on the upper level of secondary education. (Euroeducatio.net, 2014) System is closely showed in Figure 6.

Figure 6: Education System in Italy



Source: Own elaboration based on Eurydice, 2016

Note: Explanation for the figure is given in the text

4.6 Education system in Germany

Germany is divided into 16 states (*Länder*) and every state has given in constitution right and obligation to secure education in given state. General guidelines for education in Germany creates Federal Ministry of Education and Research (*Bundesministerium für Bildung und Forschung*).

For children under the age of 3, there is a nursery (*Krippe*). Figure 7 displays, that from age 3 until the age of 6 there is a *Kindergarten*. None of these institutions is mandatory but has its important role in the socialisation of children and their preparation for obligatory school mode.

Compulsory education starts from basic school (*Grundschule*), children attend basic school from the age of 6. The period in which basic school ends vary in individual states in Germany. In most of the states, primary school has 4 grades, the age of the child is from 6 to 10. In Berlin and Brandenburg primary school has 6 grades, the age of the child is from 6 to 12. After finishing of primary education children continue with a study on secondary education.

Secondary education is generally divided into two levels, lower (*Sekundarstufe I.*) and upper (*Sekundarstufe II.*). The lower level is made to prepare children for the harder upper level of secondary school. The lower level is for children until the age of 10 or 12 and 15 to 16, depending on the specific state and chosen type of secondary school. Lower secondary education has two different types. Fist type of schools offers one course of

education, besides second type of school which offer several courses of education (*Schularten mit mehreren Bildungsgängen*).

Types of secondary schools on the lower level which offer only one course of education are *Gymnasium, Realschule* and *Hauptschule*. All types of secondary schools are finished by specific leaving certificate. *Gymnasiums* are in all federal states in Germany and *Realschule* and *Hauptschule* is possible to find in six states. (Nuffic, 2015)

The first option is *Gymnasium*. This type of school is determined for a student with a high interest in the study and have good learning outcomes. *Gymnasium* has two levels, the upper level of *Gymnasium* is called *Gymnasiale Oberstufe*. *Gymnasium* aims to prepare students for studying at the University. This type of school provides intensified general education. *Gymnasiums* are standard or special kind of *gymnasium*s for a student from *Realschule* or *Hauptschule,* who wants transfer upper grades of their studying.

The second type is *Hauptschule*. *Hauptschule* provides general education. According to the specialisation, *Hauptschule* leads to vocational qualification but it is possible to continue higher education entrance qualification. *Hauptschule* usually takes 5 or 9 years of studying. Studying includes general subjects as mathematics, biology, history etc., but also pre-vocational study (*Arbeitslehre*). The aim of this type of school is to better accommodate children different abilities and eventually help them to change for a different type of secondary education. Schools which provide education for the duration of 9 years offer to their student to take one extra year and make another leaving certificate.

The second type is *Realschule. Realschule* provides to their student's more extensive general education. *Realschule* usually cover grade 5 to 10. *Realschule* provides to courses leading to a vocational qualification and higher education qualification. In the end of Realschule, they will get leaving certificate. This kind of certificate qualifies students to transfer to a school that provides vocational or higher education. (Eurydice, 2010)

Types of secondary school on lower level which offer two courses of education are: *Mittelschule* (Sachsen), the *Regelschule,* the *Sekundarschule* (Bremen, Sachsen-Anhalt), the *Erweiterte Realschule*, the *Haupt- und Realschule, the Verbundene* or *Zusammengefasste Haupt- und Realschule*, the *Regionale Schule,* the *Realschule* plus, the *Regionalschule*, the *Oberschule* (Brandenburg) and the *Mittelstufenschule*. Schools offering three types of education as:

- Comprehensive School (*Integrierte Gesamtschule*), Cooperative Comprehensive School (*Kooperative Gesamtschule*), Undenominational School (*Gemeinschaftsschule*). In states: Baden-Württemberg, Saarland, Sachsen-Anhalt, Schleswig-Holstein, Thüringen
- Integrated Secondary School (*Integrierte Sekundarschule*), the *Oberschule*. In states: Bremen, Niedersachsen
- The District School (*Stadtteilschule*), The Secondary School (*Sekundarschule*). In state Nordrhein-Westfalen. (Nuffic, 2015)

The upper level of secondary school is dedicated to children between 15 or 16 and 18 or 19 years old. In spite of different mentioned ages, school is obligatory for all groups, length of schooling is designed by individual state in Germany. On the upper level of secondary education children can continue to the Gymnasium (*Gymnasiale Oberstufe*), *Fachoberschule* or *Berufsfachschule*. Upper secondary education is generally possible to divide into two categories: upper secondary education providing general information and upper secondary education providing vocational school and vocational training in the dual system.

General education provides an upper level of gymnasium (*Gymnasiale Oberstufe*). And vocational schools and vocational training in the dual system represents *Fachoberschule* and *Berufsfachschule*. Common principles for upper secondary education ensures Standing

Conference of the Ministers of Education and Cultural Affairs. Upper gymnasium (*Gymnasiale Oberstufe*) is divided into three main subject areas. Languages, literature and art; Social sciences; mathematics, natural sciences and technology. The final examination is called Abitur and this exam is necessary to be accepted to the higher education level.

Vocational upper secondary education includes *Berufsfachschule* and *Fachoberschule*. Then *Berufoberschule*, *Berufliches Gymnasium* and *Berufsoberschule*. Vocational training on those type of schools provides education for students who want to succeed in the tertialy sector.

Berufsfachschulen is full-time school, offering to their student vocational education and training for the future occupation which requires special training. The number of

possible specialisation is very diverse. The length of training at *Berufsfachschulen* varies from one to three years according to the career specialisation.

Fachoberschulen leads to practical knowledge and skills. The *Fachoberschule* is divided into the fields of study business and administration, technology, health and social work, design, nutrition and home economics, as well as agriculture, bio- and environmental engineering. (Eurydice, 2010; Nuffic, 2015)

4.6.1 Higher education

The higher education is intended for students who finished upper secondary education. Institutions in Germany providing higher education are those types:

- Universities (*Universitäten*) and equivalent institutions
- Colleges of art and music (*Kunsthochschulen und Musikhochschulen*)
- Universities of applied sciences (*Fachhochschulen*)
- Professional academies (*Berufsakademien*)
- *Fachschulen*

The second type, colleges of art and music are determined for artistically oriented students. There is possible to study art, design, music subject or subject-focused of the area of film and television, media etc.

Fachhochschulen is practically oriented. Studying contain one semester of practical training. Usually, professors teaching on the *Fachhochschulen* have practical experiences and not only academic background without practice.

Berufsakademien have a dual system, one part is academic training and the second part is practical professional training. During the studying and professional training students receive wages from institutions, where students have their training.

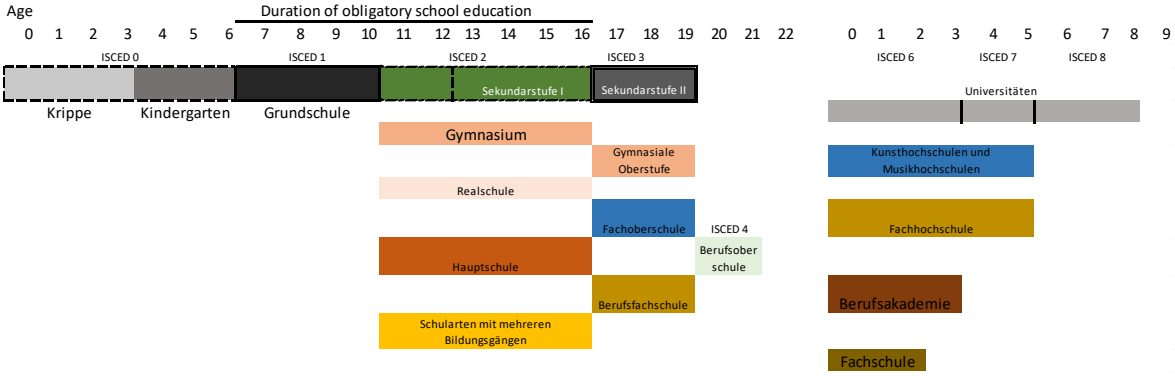
Fachschulen provide education and training for professions requiring formal training. Fields of study are agricultural economy, design, technology, business, social work. They are deepening professional qualification.

German higher education follows Bologna Process. The system of Bachelor and Master titles is used. For the Bachelor level, the form of granted academic title is distinguished according to the institution of higher education which was finished. There

can be Bachelor of Arts (B.A), Bachelor of Science (B.Sc.), Bachelor of Engineering (B.Eng.), etc. Also for Master study which can be: Master of Arts (M.A), Master of Science (M.Sc.), Master of Engineering (M.Eng.) etc. The third level is PhD programme.

In the end of the study the final state examination is usually not necessary. The state exam (*Staatsprüfung*) have to be done only in the case of medicine, dentistry, veterinary medicine, pharmaceutics, food chemistry, law and some teaching profession. (Eurydice, 2017; HRK, 2018)

Figure 7: Education System in Germany



Source: Own elaboration based on Eurydice, 2016

Note: Explanation for the figure is given in the text

4.7 Education System in the Netherlands

In the Netherlands, responsibility for education in the country has The Ministry of Education, Culture and Science (OCW).

As Figure 8 shows, education in the Netherlands is compulsory for children from 5 until the age of 16. For children under age determined as an obligatory, there is a nursery and kindergarten (*Voorschoolse educatie en kinderopvang*). Obligatory basic school (*Basisonderwijs*) starts from age of 5 until the age of 12. Optional basic school attendance starts from age of 4. Children attend basic school usually 8 years. Basic education is provided by basic primary schools (*basisonderwijs*) or by primary schools providing

special education (*speciaal onderwijs*). On the basic school, children interest about studying are determined and depending on children school results and interest, they move to the secondary education (*voortgezet Onderwijs*).

Selecting of secondary education depends on children interest and also school's recommendations. Frequently the national test knowsn as *Citotoets* is taken. Then there are two categories: General secondary education (*algemeen voortgezet onderwijs*) under which belong type of schools as: VWO and HAVO, or preparatory secondary vocational education (*beroepsgericht voortgezet onderwijs*) under which VMBO schools belong. Secondary education is compulsory until the age of 16 or 18, depending on chosen institution and children start secondary education at the age of 12. (Eurydice, 2005)

General secondary education has categories VWO (*Voorbereidend wetenschappelijk onderwijs*) – University preparatory education and HAVO (*Hoger algemeen voortgezet onderwijs*) – Senior general secondary education. Both schools are ended by national examination, in case of VWO by 7 subjects and in case of HAVO, there are 6 subjects. If the exam was successfully passed, a diploma is awarded. The diploma is VWO or HAVO according to the institution. Students studying on HAVO or VWO have to choose one of four possible specialisations as culture and society (*cultuur en maatschappij*), economics and society (*economie en maatschappij*), science and health (*natuur en gezondheid*) or science and technology (*natuur en techniek*). Studying on HAVO secondary schools last years and students can continue to the Bachelor level on HBO – University of applied sciences. And studying on VWO secondary schools take 6 years and students can continu to the Bachelor level on WO – Research university.

The second type preparatory secondary vocational education – VMBO schools are professionally oriented and stadium last 4 years. First two years student study basic theoretical subject and another two years they have to choose one of your possible sectors as technology; health and personal care and welfare; economics or agriculture. VMBO in more focused on practical knowledge than general secondary education (HAVO, VWO). Within each study sector students have to choose learning track. Tracks help with the future direction of students. They can choose from: the basic vocational track (*basisberoepsgerichte leerweg*), advanced vocational track (*kaderberoepsgerichte leerweg*), the combined track (*gemengde leerweg*) and the theoretical track (*theoretische*

leerweg). The theoretical track is giving the possibility to continue with studying at HAVO secondary school. The other tracks provide the possibility to continue to MBO – Senior secondary vocational education and training. Study program ends with a national examination and if it is passed successfully the VMBO diploma is awarded.

Upper secondary education for VMBO type of schools presents MBO – Senior secondary vocational education and training. This type of education prepares students for work in the field they have chosen on lover secondary education level - VMBO. The length of study program depends on the chosen area. Senior secondary education has four training levels (Middenkaderopleiding; Vakopleiding, Entreeopleiding; Basisberoepsopleiding). Study level one takes half or one year as an assistant training and the output is assistentopleiding diploma. The second level represents vocational training which takes 2 or 3 years and output is getting basisberoepsopleiding diploma. (Nuffic, 2015)

The third level is vocational training and takes 2 to 3 years and the output is getting vakopleiding diploma. The last, fourth level takes 4 years of studying and provides management training. After finishing of fourth level students can continue to the higher professional education level - HBO. The fourth level also includes 1 or 2 years of professional training. Part of MBO studying is also choosing from 2 learning tracks. One learning track is the school-based and the second one is work-based. The difference is, that on school-based education students spend 20% to 60% working as interns. And working based students have to spend more than 60% as interns. Students themselves are setting the amount of their working experiences gained during studies. (Nuffic, 2015; Eurydice, 2005)

4.7.1 Higher Education

In the Netherlands, higher education institutions are government funded, approved and private institutions. For higher education can be accepted students with a diploma from HAVO, VWO and VMBO diploma. VMBO diploma only if the fourth level was achieved. In Dutch system students from VWO (University preparatory education) can continue to the Bachelor study on Research University (WO) and fulfilling certain conditions also to University of applied sciences (HBO). Students from Senior general education (HAVO) can continue to the Bachelor study on University of applied sciences (HBO). Students from HAVO can also continue to the Research University (WO), but only in they finish one year on University of applied sciences (HBO). (Nuffic, 2013)

Bachelor level in Research University (WO) takes 3 years of study. Students after finishing will get academic title Bachelor of Art, Bachelor of Science or Bachelor of Law according to their specialisation. During study, students will focus primarily on one specialisation. In the end of study, students are required to write a short final paper called Scriptie. After Bachelor title is gained students can continue to Master study (WO).

Master level on Research University (WO) last for most of the specialisation 1 year. Two years can take for students of engineering and scientific specialisations and even three years for students studying medical and health fields. The form of academic title is different according to study specialisation. It can be Master of Arts (MA), Master of Science (MSc) or Master of Laws (LLM). During studies, students are taught about research methods and their using in practice. For finishing of master study in most of the cases writing of final paper is compulsory.

PhD study on Research University (WO) last usually 4 years and after its finishing student will get the academic title of doctor (Dr.). For studying on PhD level can only student who finished secondary level of higher education, master level. Study on PhD level is designed to bring own independent research project. The doctoral students are obliged to write own doctoral thesis (*proefschrift*) supervised by some supervisor. For finishing and receiving academic title students have to defend their doctoral thesis.

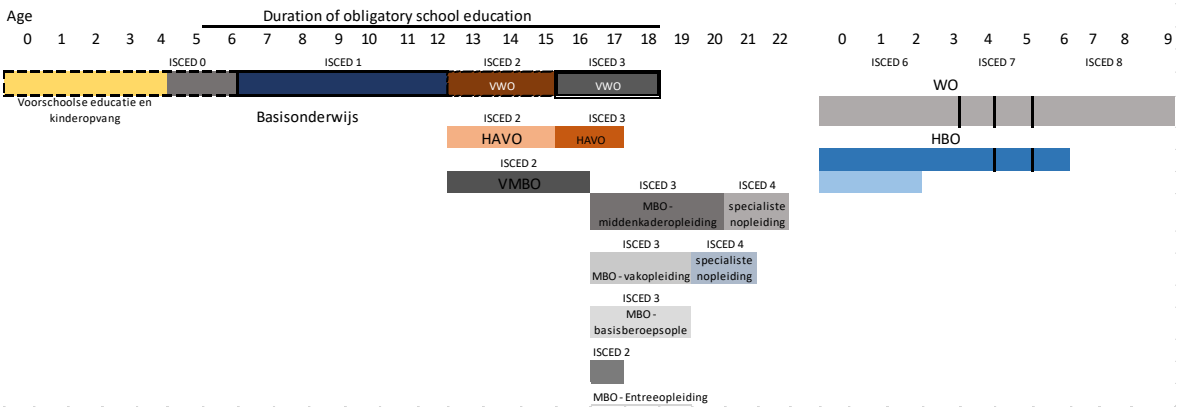
Bachelor level on University of applied sciences (HBO) is more oriented on practical skills than Research university. Duration of study is 4 years. Academic title depends on the field of study, so students can get the title as Bachelor of Economics, Bachelor of Education etc. Unlike to Bachelor's study on Research university, a student on University of applied sciences have to accomplish 9 months of compulsory internship, which will help them to get practical experiences and also with the writing of their final paper or graduation project.

In Dutch education program exist short cycle of Bachelor's degree called as Associate degree programme. Studying takes 2 years, students have to gain 120 ECTS and the programme is ended by Associate Degree. For this type of programme can students choose from fields as specialisations behaviour and society (*gedrag en maatschappij*), health care (*gezondheidszorg*), engineering (*techniek*), economics (*economie*), agriculture and the natural environment (*landbouw en natuurlijke omgeving*) and language and culture (*taal*

en cultuur). After finishing of this short programme students can continue to basic HBO's Bachelor programme.

Master programme on University of applied sciences (HBO) takes usually 1 year of study. In some specialisation can take 2 years. Students have to write a final paper or make graduation project. The emphasis in those type of programme is on applied research. In the end of study, a student can use academic title Master with addition according to specialisation. For example, Master of Economy, Master of Social Work etc. (Nuffic, 2015)

Figure 8: Education System in the Netherlands



Source: Own elaboration based on Eurydice, 2016

Note: Explanation for the figure is given in the text

4.8 Education System in the United Kingdom

The United Kingdom is divided as England, Wales, Scotland and Northern Ireland. Every part of the United Kingdom has own education system. All systems are slightly different. For better comparison there are Figures 9 – 12.

4.8.1. England

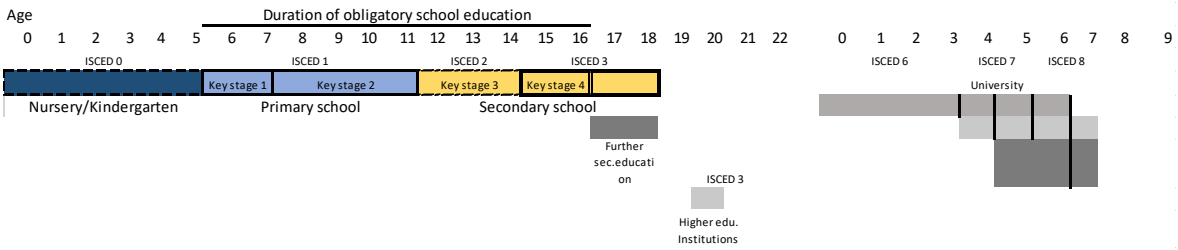
Education is compulsory for children of age 5 until 16. For children under the age level suitable for primary school, there are nurseries or kindergartens. Since 2010 children in age 3 to 4 can be for free be placed in nursery. For free are entitle to 15 hours for 38 weeks of the year. Early child education can be provided by state nursery schools, reception classes within primary schools or also in private sector devices as voluntary pre-schools, privately run nurseries or childminders.

Primary education has two key stages. Key stage 1 is for children in age group 5 until 7 and key stage 2 is for children in age group 7 until 11. Children are evaluated until the end of every key stage. Most of the children continue to the middle school in age of 11, but it is no exception that children can make the transition via middle schools even in different age.

After finishing od basic education, children continue to the secondary education. Secondary education is standardly for children in age of 11 until 16 and it is divided into Key stage 3 and Key stage 4. After finishing of Key stage 4, secondary education is becoming voluntarily and every course taken after finishing of compulsory stages are known as Further secondary education institutions. In the end of the Key stage, 4 of compulsory education students are tested. Most frequently by General Certificate of Secondary Education (GCSE).

Further secondary education institution’s education is not equal to the higher education. Higher education provides education on higher level than secondary education. Further secondary education is primarily taught in colleges, work-based learning, and adult and community learning institutions.

Figure 9: Education System in the United Kingdom - England



Source: Own elaboration based on Eurydice, 2016

Note: Explanation for the figure is given in the text

4.8.2. Wales

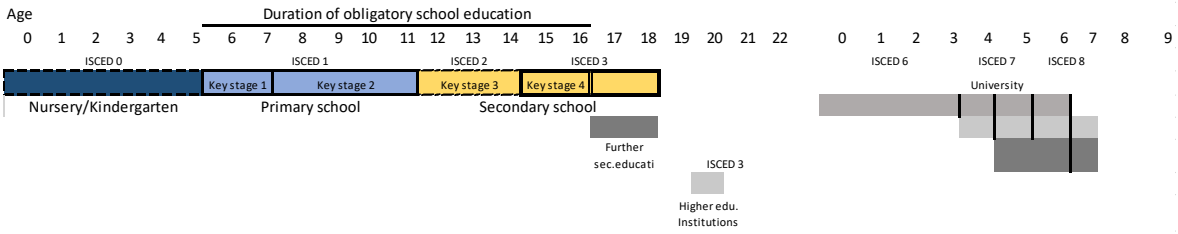
System in Wales is similar to the system in England. Obligatory education is from 5 until 16.

Until age of 5, there are nurseries provided. From age of 3, part-time nurseries are for free until the children are not accepted on the basic school in age of 5.

Primary school starts at 5 until 11. It is divided into Foundation phase and Key stage 2. What is in England defined as Key stage 1 is in Wales called Foundation stage. Like Foundation stage is called also pre-school education.

Foundation stage is until age of 7 and Key stage 2 is until age of 11. In the end of Foundation stage and Key stage 2, teachers write evaluation for their students. On the secondary education, there are also two key levels. Key level 3 start at age of 11 until age of 14. And final obligatory is Key stage 4, which is from 14 until 16. Further secondary education is voluntarily.

Figure 10: Education System in the United Kingdom - Wales



Source: Own elaboration based on Eurydice, 2016

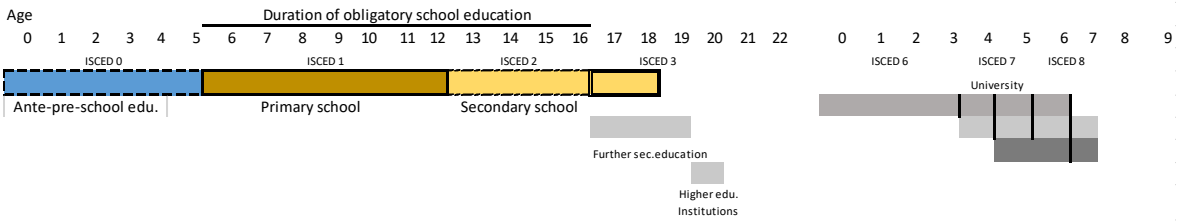
Note: Explanation for the figure is given in the text

4.8.3. Scotland

In Scotland is an emphasis on pre-school education, which is called ante-pre-school education. It is a duty of local authorities to find place in pre-school institution for children older than 3 years. For this category of children pre-school institution is for free.

Children can stay in pre-school education facilities until age of 5. Obligatory primary education starts from age of 5 until age of 12, in contrast of England and Wales where primary education ends in age of 11. Primary and secondary education is not divided on Key stages as in case of England and Wales. Obligatory secondary education is until age of 12 to the age of 16. In the end of secondary education, the students study for National Qualification. Examination is taken in the end of secondary education. Similarly, as in England and Wales Further secondary education is not obligatory.

Figure 11: Education System in the United Kingdom - Scotland



Source: Own elaboration based on Eurydice, 2016

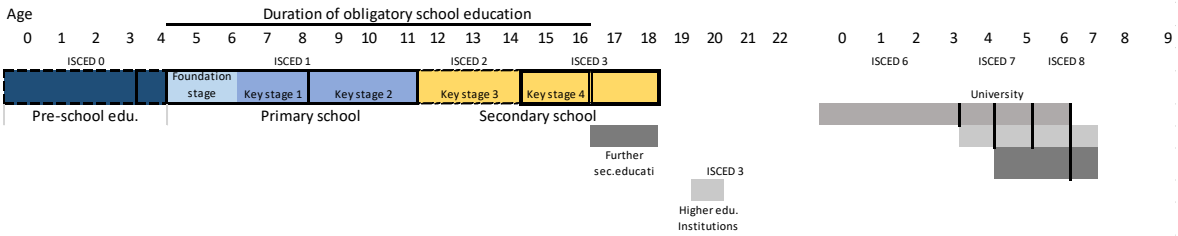
Note: Explanation for the figure is given in the text

4.8.4. Northern Ireland

In Northern Ireland, pre-school education is until age of 4. It is a duty of the Northern Ireland Executive's to provide pre-school education for children in age of 3, this is a year before obligatory school attendance. Primary school is for children from age of 4 until age of 16. Education is divided into Key stages, as in England and Wales but with slightly different ages. From 4 until 6, children are in so-called Foundation stage, from 6 until 8 in Key stage 1, from 8 until 11 in Key stage 2. In secondary education Key stage, 3 is from 11 to 14 and Key stage 3 from 14 until 16. In the end of Key stage, 1 and 2 children are assessed as in England and they participate in GCSE examination. After finishing of 5

years of obligatory secondary education, children can continue two years more on Further secondary education.

Figure 12: Education System in the United Kingdom – Northern Ireland



Source: Own elaboration based on Eurydice, 2016

Note: Explanation for the figure is given in the text

4.8.5. Higher Education

For attending of higher education institutions students must pass GCSE examination. Higher education is then provided by universities and other institutions as colleges, institutes or academies. Institutions can be provided degree and non-degree programmes. All institutions provide academic and higher professional education because there is no system in which some institutions provide only academic and same only higher professional education. Institution itself is choosing if they will provide program with academic or professional focus. Degree programmes are after graduation awarded by a bachelor's, master's or doctor's degree. And non-degree programmes receive diploma or certificate.

University study is divided into undergraduate and postgraduate level. Undergraduate is after finishing of secondary education as a bachelor's degree. Postgraduate are masters and doctor's degree. The most bachelor's degrees can be finished in 3 years. Only in case of Medicine, Veterinary Science, Dentistry and Architecture takes 5 or 6 years. Academic title after finishing of study has its ending according to the field of study. For example BEd – Bachelor of Education, BEng- Bachelor of Engineering, LLB- Bachelor of Law etc. Students are evaluated during whole study programme by their group work, presentations essays etc. Being student of Master programme in UK is not easy. For accepting to this level student needs to prove his/her quality during Bachelor study. Most of the master's

degrees takes 1 year of study. Some Master's degrees with technical specialisation can take 4 years of study.

After Master's degree students can be admitted to the PhD level. It is more focused on research and study can take 2 or 3 years usually. In the end, student write their doctoral thesis.

There are two most important non-degree qualifications. Higher National Diploma (HND) and Higher National Certificate (HNC). Higher National Diploma requires 2 years of study and sometimes it includes one extra year of practical work. Higher National Certificates takes 2 years of study. In terms of level, a Higher National Diploma is 1 year below that of a bachelor's degree (Nuffic, 2015).

5 Practical Part

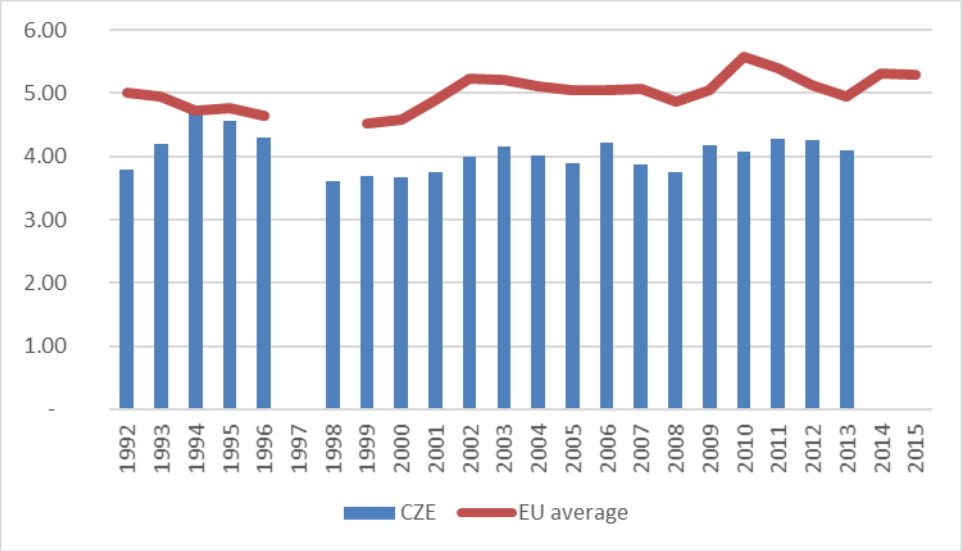
The positive impact of education in the economic growth of the country has been proved by many authors (see Barro, 1995; Hanushek and Wößmann, 2007). One of the most important indicators of country's support of education are the government expenditures on education. In this chapter are used government expenditures on education expressed as percentage of GDP.

All collected data are analysed in period from 1992 to 2015, although some of the data are missing due to the availability. The trend analysis is hence used for six out of the eight observed EU countries, as most of the data for the observed period is unavailable. In addition, trend analysis is also used for determination of future values of government expenditures on education in each country. Besides trend analysis, simple regression is also used to examine if an unemployment rate in the country is directly affected by the expenditure on education expressed as the percentage of GDP. Moreover, specific problematics of each country's education system is highlighted.

5.1 Czech Republic

Czech Republic is a country, which has in long-term lower GDP than average of European Union. In terms of GDP per capita (in current 2010 USD) in 1992, GDP per capita was 12,318 USD, while the EU average was 25,248 USD. Although, the difference had been decreasing throughout the years and in 2015 Czech GDP per capita was 21,381 USD while EU average was 35,230 (World Bank, 2017). As Figure 12 shows, investments of the Czech Republic to the education are in the long-term lower than average expenditures of the European Union. The highest expenditures on education were in 1994. In this year expenditures were 4.71% of GDP, while average of EU was 4.73% of GDP. Slow approach was also in years 1993, 1995, 1996. After those years, expenditures of the Czech Republic had downward trend. The highest indicator after this period was 4.28% in 2011, but EU average expenditures had increasing tendency, therefore in 2011 EU average was 5.40% of GDP. Simultaneously value of expenditures of the Czech Republic, since 1992 did not fall below 3.61% of GDP.

Figure 13: The Czech Republic – Government Expenditure on Education (% of GDP)



Source: Data provided by World Bank Databank, 2018
Note: The data for years 1997, 1998 of EU average is not available
Note 2: The data for years 1997, 2014 – 2015 for the Czech Republic is not available

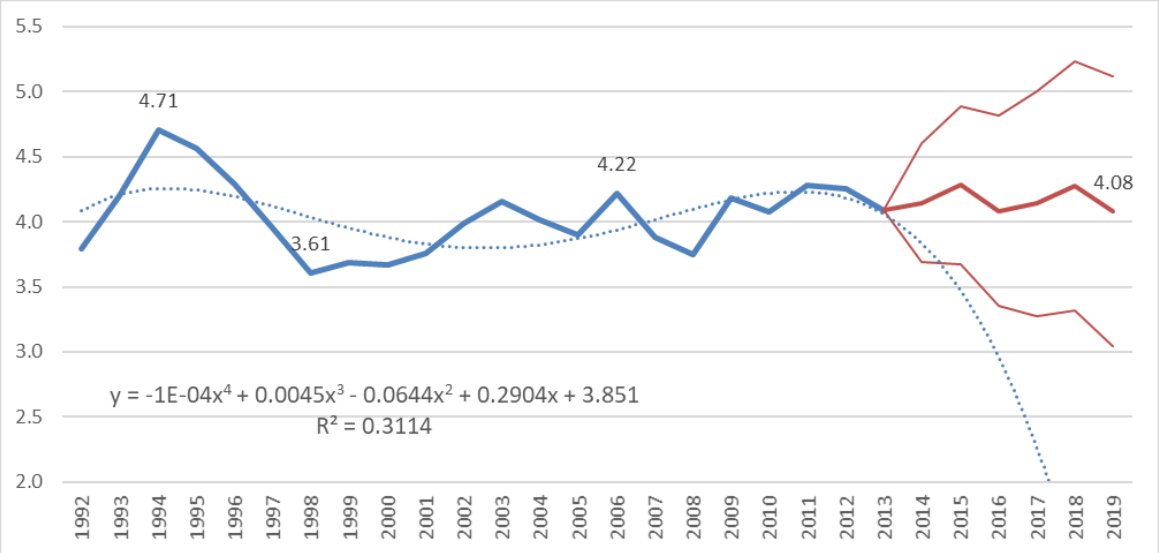
According to the Czech Ministry of Education, Youth and Sports (2017), budget for year 2018 is historically highest, with 168.6 billion CZK. This budget is about 20 billion higher than budget for year 2017. With addition of EU's financing, budget for the Czech Republic's education for year 2018 is 175.7 billion CZK. Higher budget should be invested into support of universities and as a salary increase for pedagogical and non-teaching staff.

Additionally, expenditure on public and private institutions per student in 2016 were 4,729 EUR for ISCED 1-2 (basic schools, 1st and 2nd stage), for ISCED 3-4 (secondary schools with leaving-exam or apprenticeship certificate) expenditure was 5,630 EUR, and for ISCED 5-8 (tertiary education, bachelor, master or doctoral study programmes) expenditure was 7,639 EUR (European Commission, 2017; Czech Ministry of Education, Youth and Sport, 2012).

The European Commission in its Education and Training Monitor for the Czech Republic, 2017 also mention further specifics of Czech education system. The positive factor is very high employment rate of recent graduates. On the contrary, problematics of Czech education is highlighted through inequalities in educational outcomes for pupils/students from different socioeconomic backgrounds, which is most visible in case of

Roma population. Moreover, salaries of teacher are relatively low, which leads to ageing of teaching workforce.

Figure 14: Trend Analysis of Czech Expenditure on Education (% of GDP)



Source: Data provided by World Bank, 2018

Figure 14 shows expenditures of the Czech government on education between years 1992 to 2013. The estimated values are for years 2014 to 2019. While the highest share of expenditure on education was recorded in 1994 with 4.7% of GDP, the lowest share of expenditure appeared in 1998 with about 3.6% of GDP. Since then, the government expenditures on education has been fluctuating around 4% of GDP. The trend analysis shows, that the Czech expenditure on education can be best explained by the polynomial trend function of fourth degree. The equation of the function is $y = -1E\text{-}04x^4 + 0.0045x^3 - 0.0644x^2 + 0.2904x + 3.851$. The coefficient of determination $R^2 = 0.3114$, which points out, the expenditures on education can be explained only from about 31% by the polynomial trend of fourth degree. For estimation of future values is used forecast function of MS Excel 2016, which considers also seasonality. The forecasted values for years 2014 to 2019 together with the confidence interval $\alpha = 95\%$ are shown in Table 2. It can be thus said that the forecasted value of government expenditure on education in 2019 will be with 95% probability between 3.04% and 5.12% of Czech GDP.

Table 2: Czech Republic Estimated Future Expenditures on Education (% of GDP)

Year	2014	2015	2016	2017	2018	2019
LCL	3.69	*3.67*	*3.35*	*3.28*	*3.32*	*3.04*
Forecast	**4.15**	**4.28**	**4.08**	**4.14**	**4.28**	**4.08**
UCL	*4.60*	*4.89*	*4.82*	*5.01*	*5.23*	*5.12*

Source: Own calculation based data from World Bank, 2018

5.1.1 Unemployment and Education Expenditure in the Czech Republic

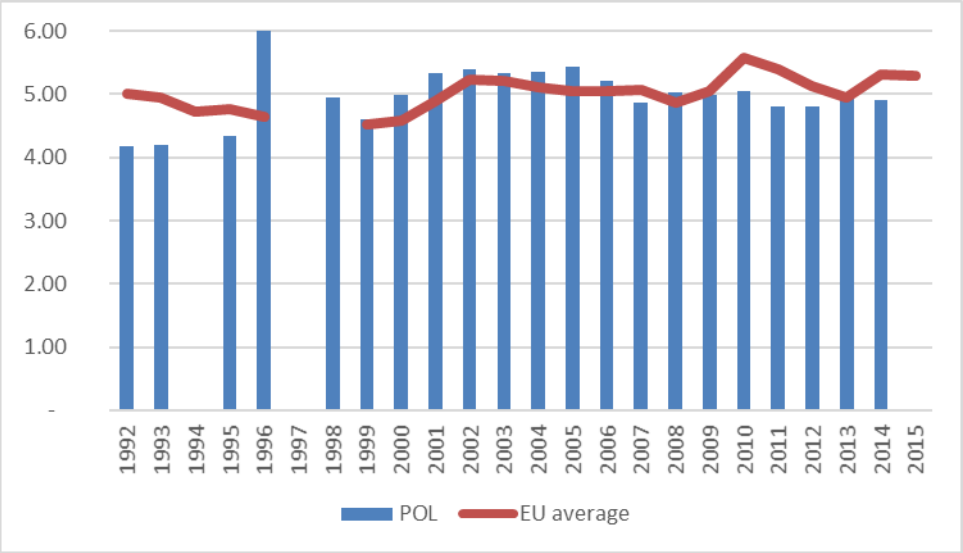
Simple linear regression has been used to find out the effect of expenditure of the government on education expressed as the percentage of GDP on unemployment rate in the Czech Republic expressed as the percentage of the total labour force. Analysed data for expenditure on education and unemployment are for the period 1992-2013. Data set and complete results of linear regression can be found in the appendix.

The coefficient R^2 of the simple linear regression equals to 0.094, which indicates that only around 2% of variation in unemployment can be explained by the expenditure on education. Moreover, results are no statistically significant at the level of significance α = 95%, as the Significance F is 0.16. Therefore, it can be said that no statistically significant effect of expenditure on education on the unemployment rate has been found.

5.2 Poland

In Poland, expenditure on education between 1992 and 2015 had been overall comparable to the EU average. The highest expenditure of Polish government was in 1996 with 6.27% of GDP spent on education. Also, years 2000 to 2006 were above the EU average (Figure 15). In terms of expenditure on public and private institutions per student, in the year 2013, spending was 5,094 EUR for ISCED 1-2, 4,460 EUR for ISCED 3-4, and 6,580 EUR were for higher education in ISCED 5-8 (European Commission, 2017). In case of Programme for International Student Assessment (PISA) results from 2015, Poland is one of the best-performing EU countries. Moreover, Poland is on the 3rd place in Reading and Mathematics sections of PISA, and on the 4th place in Science section among the examined countries and is thus best-performing *new* member state (Table 1).

Figure 15: Poland – Government Expenditure on Education (% of GDP)



Source: Data provided by World Bank, 2018
Note: The data for years 1997, 1998 of EU average is not available
Note 2: The data for years 1994, 1997, 2015 for Poland is not available

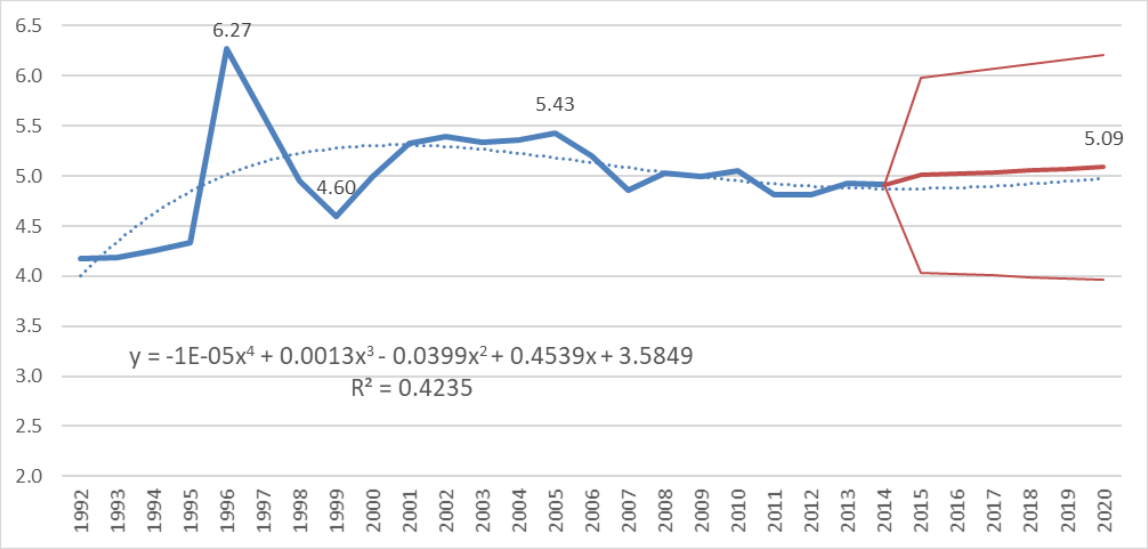
Since the beginning of 2017, Poland has started to implement significant educational reform. The reform should be fully implemented between 1 September 2017 and the school year 2022/23. Main goal of the reform is to provide students quality educational background required for the needs of contemporary labour market. Among others, the reform includes the change in the school structure, free of charge textbooks, introduction

of sectoral VET (vocational education and training), or obligation for 6-year-olds to attend one-year pre-primary education (Eurydice, 2017).

The new educational structure is then as follows:

- 8-year primary school (ISCED 1 + ISCED 2),
- 4-year general secondary school,
- 5-year technical secondary school,
- 3-year sectoral VET school (stage 1)
- 2-year sectoral VET school (stage 2)
- 3-year special school preparing for employment,
- post-secondary school.

Figure 16: Trend Analysis of Polish Expenditure on Education (% of GDP)



Source: Data provided by World Bank, 2018

Trend analysis of Polish expenditures on education is displayed in Figure 16. The trend is best described by the polynomial function of the fourth degree. The equation of the function is $y = -1E\text{-}05x^4 + 0.0013x^3 - 0.0399x^2 + 0.4539x + 3.5849$. The coefficient of determination R^2 is equal to 0.4235, which explains the expenditures of Polish government from around 42%. For determination of future values is used the forecast function of MS Excel 2016. The missing values are filled by the method of interpolation. Figure 16 also shows the calculation of future values, together with the confidence interval α=95%. The

estimated value of government expenditures on education for year 2020 is 5.09% of GDP. Furthermore, it can be said that with 95% probability, the expenditures will be between 3.97 and 6.21% of GDP. All predictions for years 2015 to 2020 are in the Table 3.

Table 3: Poland - Estimated Future Expenditures on Education (% of GDP)

Year	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
LCL	4.03	*4.02*	*4.01*	*3.99*	*3.98*	*3.97*
Forecast	**5.01**	**5.03**	**5.04**	**5.06**	**5.07**	**5.09**
UCL	*5.98*	*6.03*	*6.08*	*6.12*	*6.17*	*6.21*

Source: Own calculation based on data from World Bank, 2018

5.2.1 Unemployment and Education Expenditure in Poland

Simple linear regression was used to find out the effect of expenditure of the government on education expressed as the percentage of GDP on unemployment rate in Poland expressed as the percentage of the total labour force. Analysed data for expenditure on education and unemployment rate are for the period 1992-2014. Data set and complete results of linear regression can be found in the appendix.

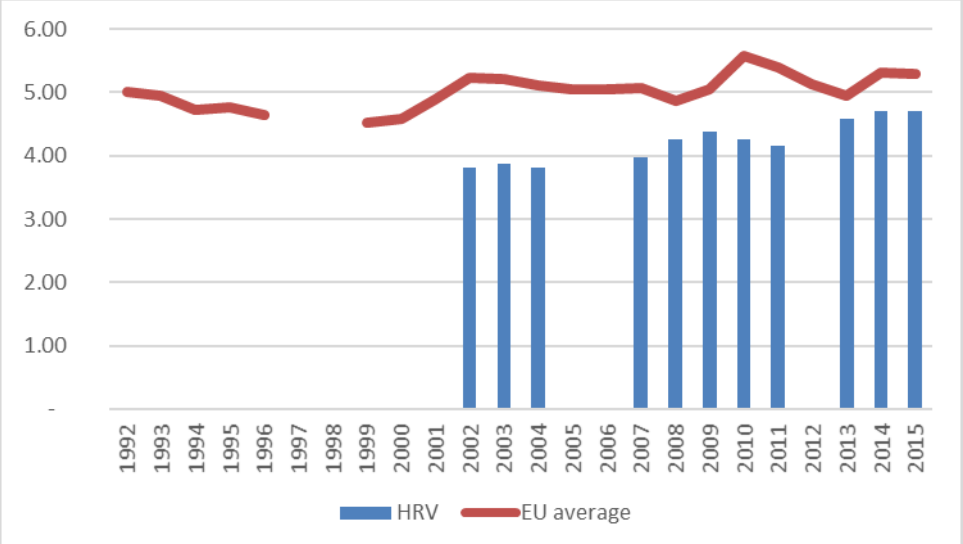
The coefficient R^2 of the simple linear regression equals to 0.046, which indicates that just around 5% of variation in unemployment can be explained by the expenditure on education. Moreover, results are no statistically significant at the level of significance α = 95%, as the Significance F is 0.32, hence higher than needed 0.05. Therefore, it can be said that no statistically significant effect of expenditure on education on the unemployment rate has been found.

5.3 Croatia

Croatia is the *"youngest"* EU family member, as it was accepted in 2013. Although most of the data for the observed period of 1992 to 2016 are missing, from the Figure 17 is obvious that the expenditures on education in Croatia find themselves under the EU average. The highest expenditure of Croatian government was in 2013 with 4.58% of GDP spent on education. The EU Commission in its Education and Trainings Monitor for Croatia, 2017 highlights the expenditures on public and private institutions per student. In the year 2013, spending was 3,350 EUR for ISCED 1-2 and 3,196 EUR for ISCED 3-4, the values for ISCED 5-8 are not available. The Programme for International Student Assessment (PISA) results from 2015, shows that Croatia is after the Romania, the second worst performing country among the observed countries (Table 1). Substantial number of students at the age of 15 have insufficient skills in mathematics and science.

Furthermore, due to unavailability of most of the data, the trend analysis and prediction of future values is not provided for Croatia. Although from the Figure 17 is understandable, that government expenditure has been chiefly increasing. In addition, Croatian government is aware of importance of education and besides reforms, the state budget for education for 2017 has been increased by 14% in absolute terms, compared to year 2016 (European Commission, 2017).

Figure 17: Croatia – Government Expenditure on Education (% of GDP)



Source: Data provided by World Bank, 2018; EC, 2017
Note: The data for years 1997-1998 of EU average is not available
Note 2: The data for years 1992-2001, 2005,2006,2012 for Croatia is not available

The EU Commission, 2017 also points out other specifics of Croatian education system. In comparison to the rest of the EU, Croatia has the lowest early school leaving rate. In EU, early school leavers are defined as people aged 18-24 who have only lower secondary education or less and are no longer in education training (Europa.eu, 2011). Moreover, as mentioned above, number of reforms have been prepared by Croatian government to improve the level of education, e.g. the Strategy for Education, Science and Technology, or the associated curricular reform. Nevertheless, the progress has been limited.

5.3.1 Unemployment and Education Expenditure in Croatia

Simple linear regression was used to find out the effect of expenditure of the government on education expressed as the percentage of GDP on unemployment rate in Croatia expressed as the percentage of the total labour force. Because of the availability of the data for government expenditure on education, the analysed data is for the period 2007-2011. Data set and complete results of linear regression can be found in the appendix.

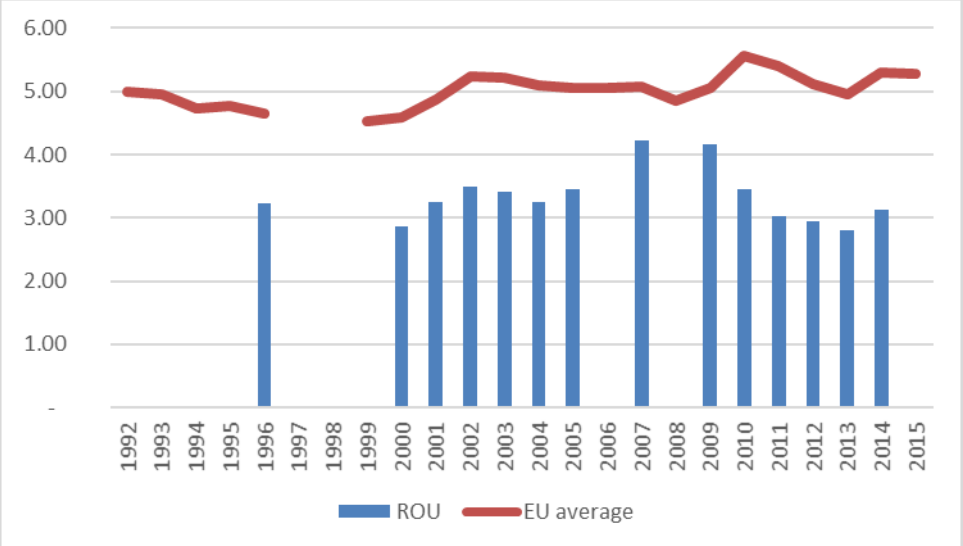
The coefficient R^2 of the simple linear regression equals to 0.069, indicating that only around 7% of variation in unemployment can be explained by the expenditure on education. Moreover, results are no statistically significant at the level of significance α = 95%, as the Significance F equals 0.67, hence higher than needed 0.05. Therefore, it can be said that no statistically significant effect of expenditure on education on the unemployment rate has been found.

5.4 Romania

In Romania, expenditures on education between 1992 and 2015 had been overall significantly lower compared to the EU average. The highest expenditure of Romanian government was in 2007 with 4.22% of GDP spent on education. Second best year in terms of education expenditures was 2009 with similar value of GDP spent on education as in 2007. However, since 2009, the spending has been again decreasing. From Figure 18 is likewise evident, that the education is probably not the priority of the Romanian government. Consequently, but also given by the economic strength of the country, expenditure on public and private institutions per student is lowest among the observed EU countries. In 2013, expenditure per student in ISCED 1-2 reached only 1,700 EUR, in ISCED 3-4 1,959 EUR, and in ISCED 5-8 2,979 EUR (European Commission, 2017).

Table 1 displays, that Romania earned the lowest PISA score among the observed countries. Furthermore, results of PISA survey from 2015 point out the differences in students' performance for students with different socioeconomic background. More than half of the students from the lower socioeconomic quartile in science, reading and mathematics (OECD, 2018). This is caused by the challenged access to quality mainstream education for students in rural areas and for Roma population (European Commission, 2017).

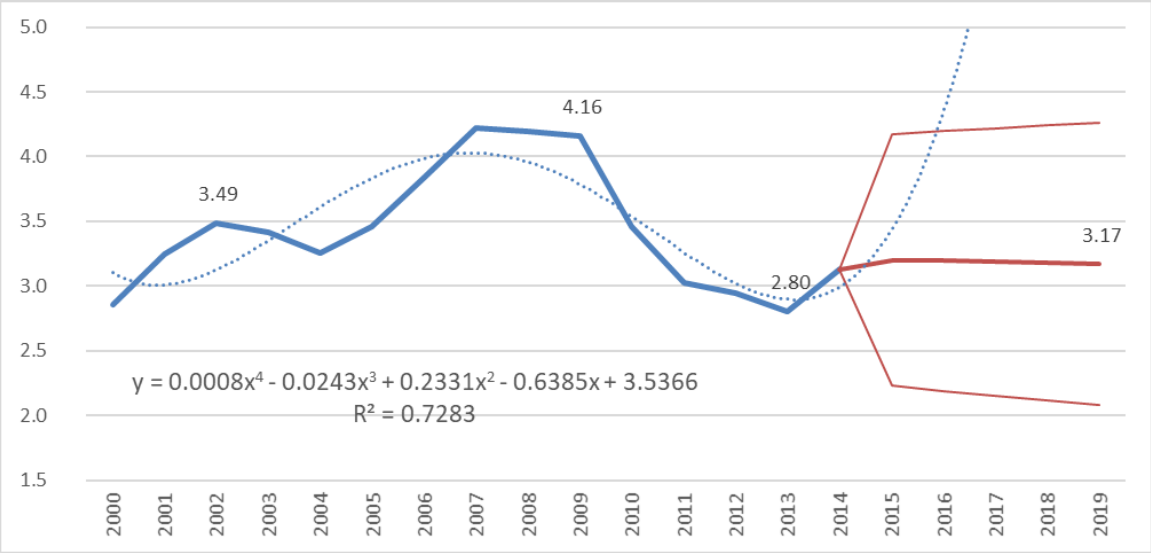
Figure 18: Romania – Government Expenditure on Education (% of GDP)



Source: Data provided by World Bank, 2018; EC, 2017
Note: The data for years 1997,1998 of EU average is not available
Note 2: The data for years 1992-1995, 1998,1999,2006,2008,2015 for Romania is not available

Compared to Poland, Romania has one of the highest share of early school leavers (ESL), third highest in the whole EU, which influences the labour market and economic growth. High ESL is concentrated again in rural areas and among Roma. Besides ESL, Romania has the lowest tertiary educational attainment in the European Union.

Figure 19: Trend Analysis of Romanian Expenditure on Education (% of GDP)



Source: Data provided by World Bank, 2018

Due to the availability of the data, the trend analysis is based on values from years 2000 to 2014. The trend is best described by the polynomial function of the fourth degree (Figure 19). The equation of the function $y = 0.0008x^4 - 0.0243x^3 + 0.2331x^2 - 0.6385x + 3.5366$. Romanian expenditure on education is described by the polynomial function from about 73% as the coefficient of determination R^2 is equal to 0.7283. Although it is very unlikely that the expenditures would exceed 11% of GDP as depicted by the trend line in Figure 19. In country with long-term lowest spending on education in EU.

For determination of future values is thus used the forecast function of MS Excel 2016. The missing values are filled by the method of interpolation. Besides calculation of future values, Figure 19 also shows confidence interval α=95%. The estimated value of government expenditures on education for year 2019 is 3.17% of GDP. Which is possibly realistic prediction for Romania. Furthermore, it can be said that with 95% probability, the

expenditures will be between 2.08% and 4.26% of GDP. All predictions for years 2015 to 2019 are in the Table 4.

Table 4: Romania - Estimated Future Expenditures on Education (% of GDP)

Year	**2015**	**2016**	**2017**	**2018**	**2019**
LCL	*2.23*	*2.19*	*2.15*	*2.12*	*2.08*
Forecast	**3.20**	**3.19**	**3.19**	**3.18**	**3.17**
UCL	*4.18*	*4.20*	*4.22*	*4.24*	*4.26*

Source: Own calculation based on data from World Bank, 2018

5.4.1 Unemployment and Education Expenditure in Romania

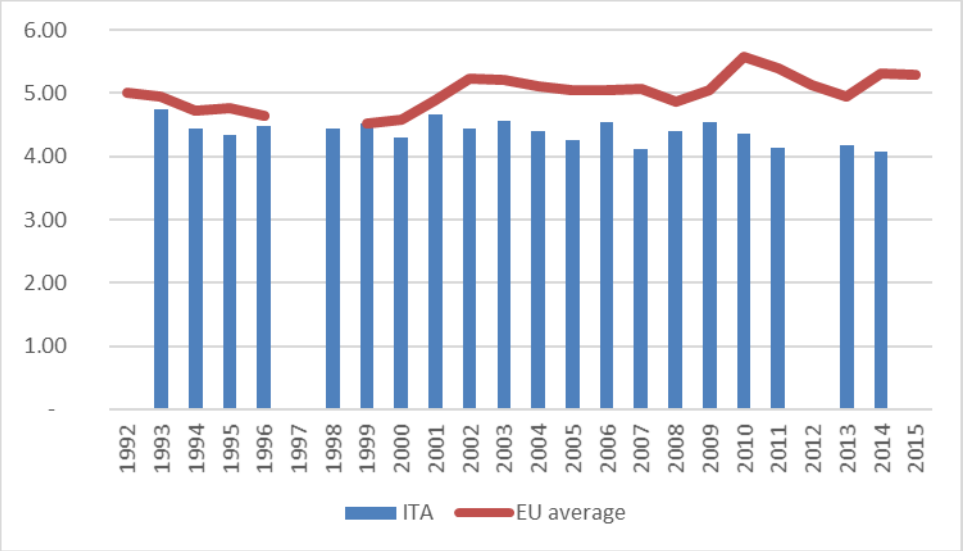
Simple linear regression was used to find out the effect of expenditure of the government on education expressed as the percentage of GDP on unemployment rate in Romania expressed as the percentage of the total labour force. Because of the availability of the data, the analysed data is for the period 2000-2014. Data set and complete results of linear regression can be found in the appendix.

The coefficient R^2 of the simple linear regression equals to 0.136, indicating that only around 14% of variation in unemployment can be explained by the expenditure on education. This is the highest R^2 among the new member states, however it is far away from being sufficient result. Moreover, results are not statistically significant at the level of significance $\alpha = 95\%$, as the Significance F equals 0.18, hence higher than needed 0.05. Therefore, it can be said that no statistically significant effect of expenditure on education on the unemployment rate has been found.

5.5 Italy

In Italy, expenditure on education between 1992 and 2015 had been overall comparable to the EU average, although since 2009 the difference between Italy and EU average has been increasing. Moreover, Italian expenditure on education has been stable around 4% during the observed period. Italy recorded the highest expenditure on education in 1993 with 4.75% of GDP spent on education (Figure 20). In terms of expenditure on public and private institutions per student, in the year 2013, spending was 6,051 EUR for ISCED 1-2, 7,086 EUR for ISCED 3-4, and 8,245 EUR were for higher education in ISCED 5-8 (European Commission, 2017). In case of Programme for International Student Assessment (PISA) results from 2015 PISA

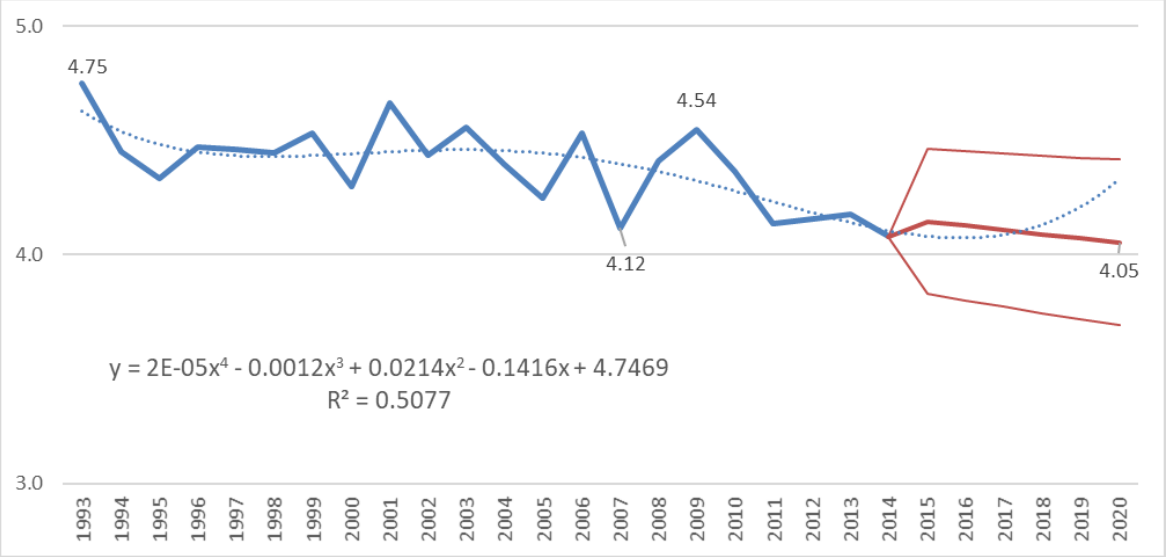
Figure 20: Italy – Government Expenditure on Education (% of GDP)



Source: Data provided by World Bank, 2018

Note: The data for years 1997, 1998 of EU average is not available
Note 2: The data for years 1992,2012,2015 for Italy is not available

Figure 21: Trend Analysis of Italian Expenditure on Education (% of GDP)



Source: Data provided by World Bank, 2018

Figure 21 displays expenditure of the Italian government on education in period 1993 to 2014, together with estimated values for years 2015 to 2020. As described above, expenditures of Italy on education had been stable around 4% of GDP with slight decreasing trend, although it is one of the lowest shares in the EU. The trend analysis shows, that Italian expenditure on education can be best explained by the polynomial trend function of fourth degree. The equation of the function is y = 2E-05x4 - 0.0012x3 + 0.0214x2 - 0.1416x + 4.7469 with the coefficient of determination R^2 = 0.5077, which means, the expenditures on education in Italy can be explained only from about 50% by the polynomial trend line. Future values are determined by the forecast function of MS Excel 2016. The forecasted values for years 2015 - 2020 together with the confidence interval α = 95% are shown in table 5. It can be thus said that the forecasted value of government expenditure on education in 2020 would be found with 95% probability between 3.69% and 4.42% of Italian GDP.

Table 5: Italy - Estimated Future Expenditures on Education (% of GDP)

Year	2015	2016	2017	2018	2019	2020
LCL	3.83	*3.80*	*3.77*	*3.75*	*3.72*	*3.69*
Forecast	**4.15**	**4.13**	**4.11**	**4.09**	**4.07**	**4.05**
UCL	*4.46*	*4.45*	*4.44*	*4.43*	*4.42*	*4.42*

Source: Own calculation based on data from World Bank, 2018

5.5.1 Unemployment and Education Expenditure in Italy

Simple linear regression was used to find out the effect of expenditure of the government on education expressed as the percentage of GDP on unemployment rate in Italy expressed as the percentage of the total labour force. The analysed data are from the period 1993-2014. Data set and complete results of linear regression can be found in the appendix.

The coefficient R^2 of the simple linear regression equals to 0.0006, indicating that not even 1% of variation in unemployment can be explained by the expenditure on education. Additionally, results are not statistically significant at the level of significance $\alpha = 95\%$, as the Significance F equals 0.91, hence much higher than needed 0.05. Therefore, it can be said that no statistically significant effect of expenditure on education on the unemployment rate has been found.

5.6 Germany

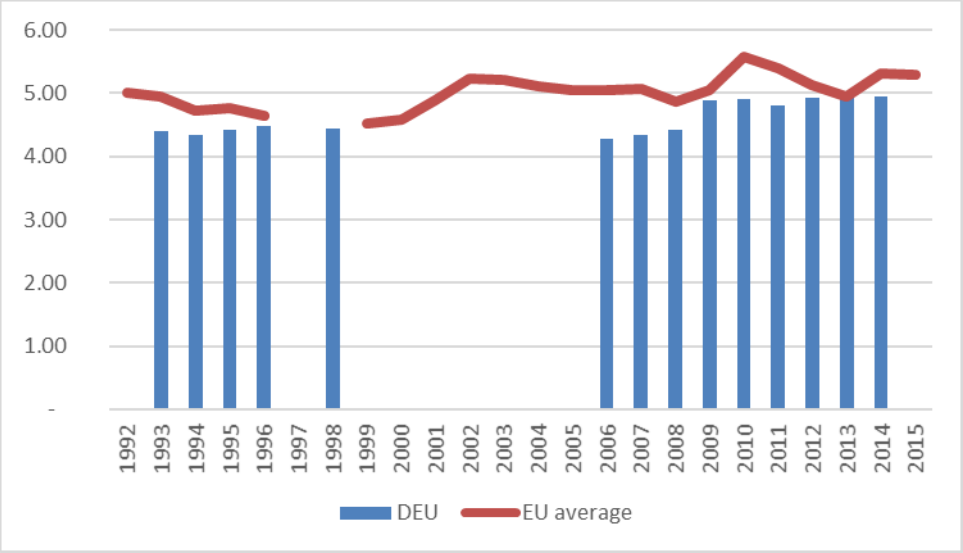
Expenditures of German government on education between 1992 and 2015 had been overall similar to the average of European Union and oscillating between 4 and 5% of GDP. The highest expenditure was recorded in 2014 with 4.95% of GDP spent on education. While the lowest expenditure on education was spent in 1993 with 4.41%. Figure 22 shows overall state of German expenditure compared to EU average. Although significant portion of the data is not accessible (1999-2005), since 2008 expenditure on education has been increasing. Furthermore, due to unavailability the data, the trend analysis and prediction of future values is not provided for Germany.

Given also by the economic strength of the country, expenditure on public and private institutions per student are significantly higher than in *new* member states. In 2013,

expenditure per student in ISCED 1-2 reached 6,826 EUR, in ISCED 3-4 9,214 EUR, and in ISCED 5-8 expenditure was already 12,469 EUR. In terms of education, new distribution of funding will come into force. From 2020 the central government will provide federal states 10 billion EUR per year. This support will focus mostly on investments in school infrastructure. (European Commission, 2017).

Table 1 shows that Germany is one of the best performers in 2015 PISA score among the observed countries. German 15-year-old students were on the shared first place in science, on the first place in reading and on the second place in mathematics. As in other countries, in Germany exists the difference in students' performance for students with different socioeconomic background. European Commission, 2017 points out the results were notably lower for students with migrant background.

Figure 22: Germany – Government Expenditure on Education (% of GDP)



Source: Data provided by World Bank, 2018

Note: The data for year 1997,1998 of EU average is not available
Note 2: The data for years 1992, 1997, 1999-2005, 2015 for Germany is not available

Associated to socioeconomic background of students, one of the most tackling issues of German education and the German society, is the integration of the large number of young migrants. The number of newly-arrived migrants reached about 1,2 million people between 2015 and 2016, and most of the asylum seeker are under 30. To integrate refugees and get them into work and education, Germany has focused mainly on vocational

education and training. New Integration Act of 2016 provides refugees easier access to work, universities and vocational training (BAMF, 2017). To engage refugees in the educational system costs extra financial efforts. It is estimated that about additional 400 million EUR will be needed to provide ECEC (early childhood educational care) for children who came to Germany in 2015, and about 1 billion EUR for primary and lower secondary schools (ISCED 1-2). For higher education, German government invests about 100 million EUR particularly to around 450 initiatives at 162 institutions. These investments vary from language trainings, practical support to legal advice.

Besides inflow of migrants, education in Germany face other topics as well. Despite good employment opportunities of graduates, declining interest of young Germans in vocational training (VET) on side and the highest share of graduates in engineering, manufacturing and construction in in the EU. This leads to the fact, that almost one fifth of university graduates have jobs inadequate their education level. (European Commission, 2017).

5.6.1 Unemployment and Education Expenditure in Germany

Simple linear regression was used to find out the effect of expenditure of the government on education expressed as the percentage of GDP on unemployment rate in Germany expressed as the percentage of the total labour force. Due to the unavailability, the analysed data are from the period 2006-2014. Dataset and complete results of linear regression can be found in the appendix.

Germany is the only observed country which has the significant coefficient of determination. Coefficient R^2 equals to 0.705, which means that variation in unemployment can be explained by the expenditure on education from solid 71%. Additionally, in case of Germany, results are statistically significant at the level of significance $\alpha = 95\%$, as the Significance F equals 0.0045, hence fits needed 0.05 limit. Therefore, it can be said that the statistically significant effect of expenditure on education on the unemployment rate has been found.

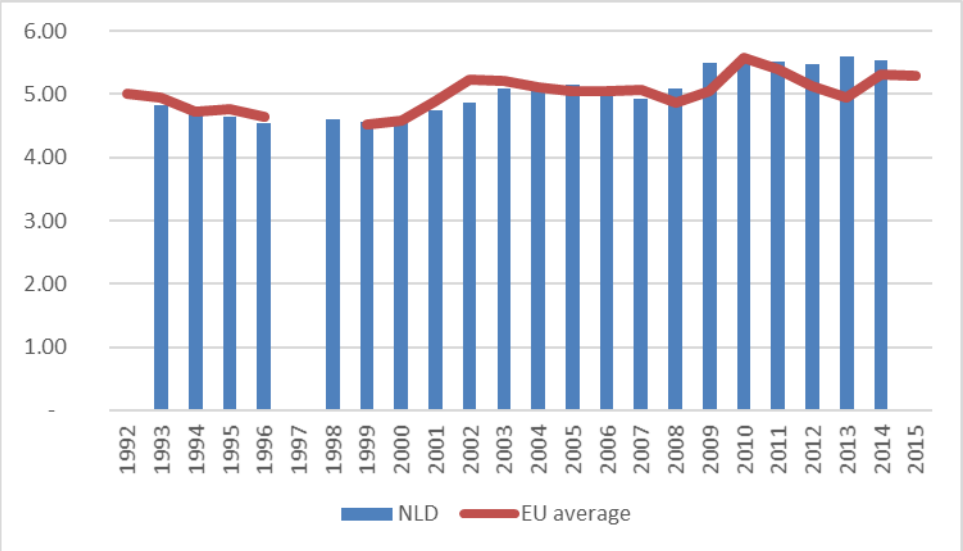
The equation is as follows: $y = 31.845 - 5.277x$,

which means one percent increase in expenditure on education should cause 5.27% decrease in unemployment.

5.7 The Netherlands

Government expenditure on education in the Netherlands has been in long-term on the same level as the EU average and since 2008, the expenditure has even surpassed the EU average. The Netherlands observed the highest expenditure in 2013 with 5.59% of GDP spent on education, while the lowest expenditure was observed in 1996 with 4.54% spent on education (Figure 23). Given by the economic strength of the country and overall high expenditure on education as a percentage of GDP, in terms of expenditure on public and private institutions per student is the second highest among the observed countries. In 2013, spending was 7,315 EUR for ISCED 1-2, 8,977 EUR for ISCED 3-4, and 13,944 EUR were for higher education in ISCED 5-8 (European Commission, 2017). In terms of Programme for International Student Assessment (PISA) results from 2015 PISA, Dutch 15-year-old students had the best score in mathematics and science, and second-best score in reading among all observed countries. (Table 1).

Figure 23: The Netherlands – Government Expenditure on Education (% of GDP)



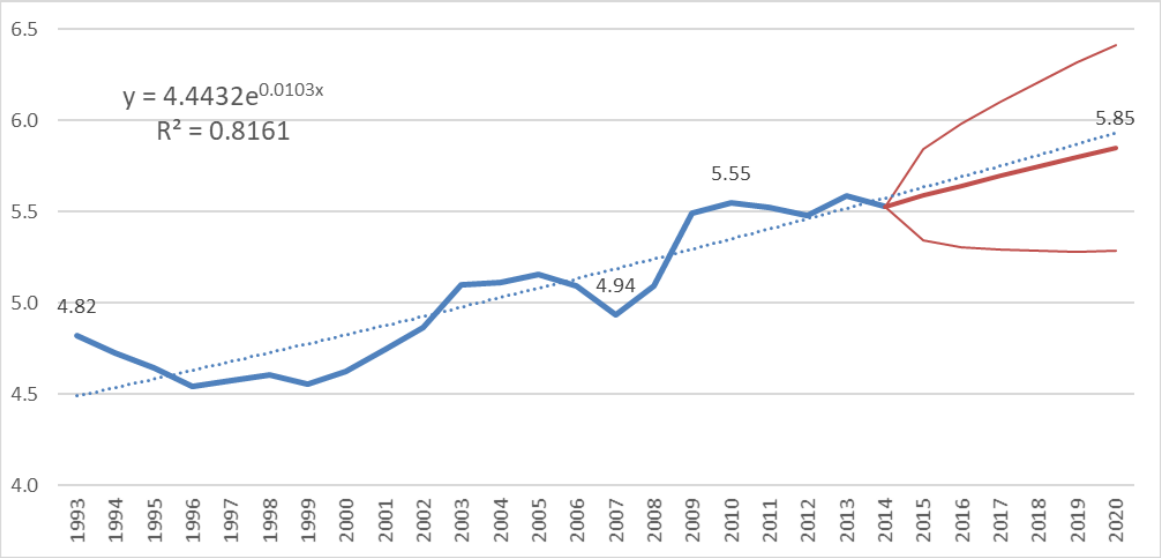
Source: Data provided by World Bank, 2018

Note: The data for years 1997. 1998 of EU average are not available
Note 2: The data for years 1992, 1997, 2015 for the Netherlands are not available

In the Netherlands, same as in most of the other EU countries, students with immigrant background obtained worse PISA score in all three areas, than the non-immigrant students, even the second generation of immigrant students. Overall, the Netherlands is a country with fairly high share of immigrant population (both EU and non-EU origin) around 2 million people (Eurostat, 2017). Therefore, inflows of people have resulted in the reorganization of their support system. Young immigrants enter the Dutch educational system via international transfer classes (ISKs). These are designed to ease the foreign students to transfer to Dutch education system and Dutch society. At the level of secondary education, the ISKs take usually two years, and then, students join regular secondary schools. Although, the main problem remains the language proficiency (European Commission, 2017).

Furthermore, Dutch educational system is threatened by the lack of teaching staff. It is expected that almost 4,000 of full-time positions will be vacant in 2020 and 10,000 in 2025 on primary education level. In terms of secondary education, there is expected shortage more in terms of specific subjects, such as mathematics, science and foreign languages. Considering tertial education, Dutch education system experienced a transition from the grant-based system to student loans. Since 2015, students are able to take low-interest loans provided by the government. The state wants then invest savings from loans in higher education. To be precise, it is 200 million EUR in 2018 and up to 600 million EUR in 2025 (European Commission, 2017).

Figure 24: Trend Analysis of Dutch Expenditure on Education (% of GDP)



Source: Data provided by World Bank, 2018

Figure 24 shows expenditures of the Dutch government on education between years 1993 to 2014, together with estimated values for years 2015 to 2020. As it has been described, expenditures of Netherland on education had been on the level of EU average, or slightly above. The trend analysis indicates, that Dutch expenditure on education can be best explained by the exponential trend function. The equation of the function is $y = 4.4432e^{0.0103x}$ with the coefficient of determination $R^2 = 0.8161$, which means, the expenditures on education in the Netherlands can be explained from about 82% by the exponential function. Future values are determined by the forecast function of MS Excel 2016. The forecasted values for years 2015 - 2020 together with the confidence interval $\alpha = 95\%$ are shown in table 6. It can be thus said that the forecasted value of government expenditure on education will be with 95% probability between 5.29% and 6.41% of GDP in 2020.

Table 6: The Netherlands - Estimated Future Expenditures on Education (% of GDP)

Year	2015	2016	2017	2018	2019	2020
LCL	*5.34*	*5.31*	*5.29*	*5.28*	*5.28*	*5.29*
Forecast	**5.59**	**5.64**	**5.70**	**5.75**	**5.80**	**5.85**
UCL	*5.85*	*5.98*	*6.10*	*6.21*	*6.32*	*6.41*

Source: Own calculation based data from World Bank, 2018

5.7.1 Unemployment and Education Expenditure in the Netherlands

Simple linear regression was used to find out the effect of expenditure of the government on education expressed as the percentage of GDP on unemployment rate in the Netherlands expressed as the percentage of the total labour force. The analysed data are from the period 1993-2014. Data set and complete results of linear regression can be found in the appendix.

The coefficient R^2 of the simple linear regression equals to 0.018, indicating that not only around 2% of variation in unemployment can be explained by the expenditure on education. Moreover, results are not statistically significant at the level of significance α = 95%, as the Significance F equals 0.54, hence much higher than needed 0.05. Therefore, it can be said that no statistically significant effect of expenditure on education on the unemployment rate has been found.

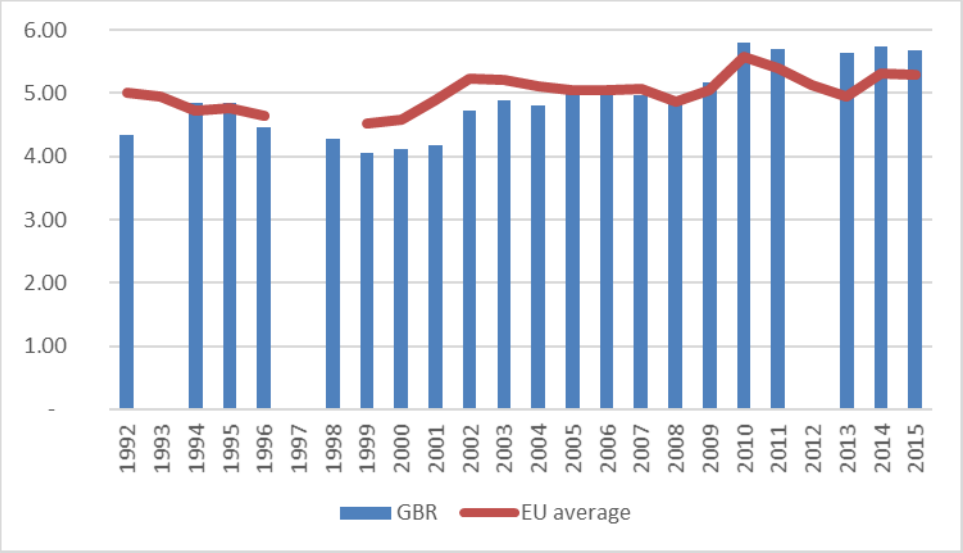
5.8 United Kingdom

In United Kingdom, expenditure on education between 1992 and 2015 had been comparable to the EU average during the observed period. The significantly lower expenditure can be observed in year 1992 and between years 1999 - 2001. Since 2010, the expenditure has started to be noticeably higher than the EU average. The highest expenditure of British government was in 2010 with 5.81% of GDP spent on education (Figure 25). Given by the high expenditure and economic strength of the United Kingdom, expenditure on public and private institutions per student is the highest among observed EU countries. In 2013, expenditure per student in ISCED 1-2 reached 8,488 EUR, in ISCED 3-4 8,581 EUR, and in ISCED 5-8 18,999 EUR.

In terms of investing in education, the aim of British government concerns mainly about demographic and skill challenges. In 2016 UK invested 20 million GBP (23.6 million EUR[1]) in the Northern Powerhouse school strategy (development strategy for northern England) which aims to close the gaps in education based on area. Additionally, new formula for education funding is going to be implemented by 2020. This should bring around additional 500 million GBP (591 million EUR[1]) to the core funding (European Commission, 2017).

Although, UK spends relatively high share of its GDP on education and has the highest expenditure per student in all ISCED groups, Table 1 shows that United Kingdom reached only first place in science (together with Germany and the Netherlands), but in reading and mathematics sections of 2015 PISA survey, performed even behind Poland. On the other hand, UK students' skill in all three categories remain stable and fairly high since 2006. Furthermore, European Commission (2017) point out that socioeconomic background has relatively minimal impact on PISA performance, compared to other observed countries. The second generation of immigrants performed even similarly to the non-immigrants.

Figure 25: United Kingdom – Government Expenditure on Education (% of GDP)



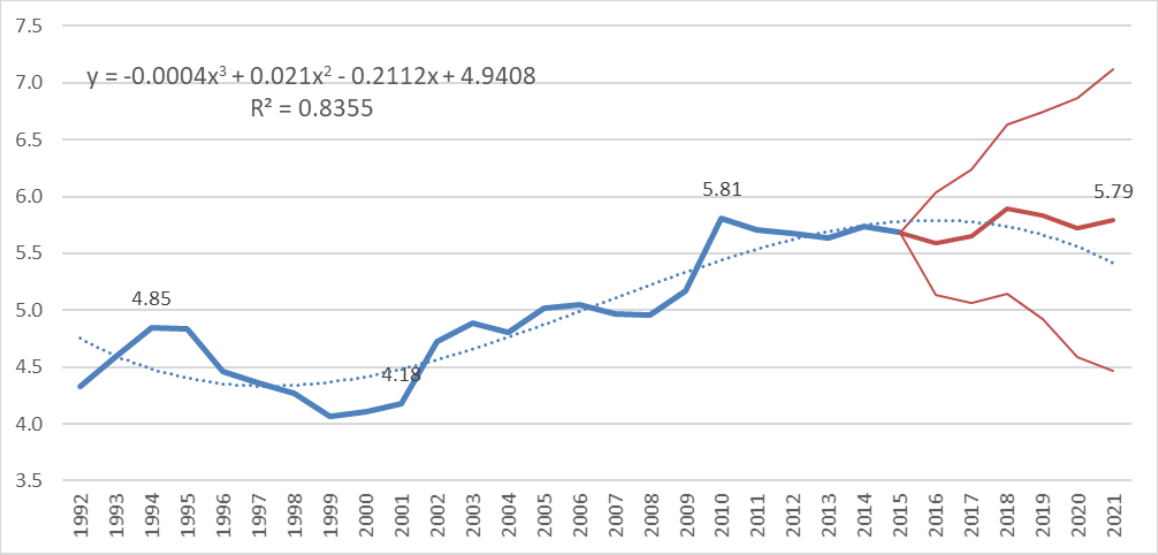
Source: Data provided by World Bank, 2018

Note: The data for years 1997, 1998 of EU average is not available
Note 2: The data for years 1993, 1997, 2012 for Great Britain is not available

[1] Author's own calculation based on average Exchange rate in 2016 (1 GBP = 1.1831)

Similarly, as in the Netherlands, UK is in need of teaching staff. Just in England, there is a need of 30,000 new teachers per year. Furthermore, except the need of new teacher, UK struggles with decreasing retention rates. Therefore, the Teaching and Leadership Innovation Fund has been set up to support professional development of teachers. The fund is worth 75 million GBP. Tertiary education attainment in UK is still one of the highest in the EU, despite the introduction of fees (except Scotland) and student loans. United Kingdom is also the only of the observed countries, and one of few in the EU, where the share tertiary graduates in the foreign-born population is higher than in the native-born (European Commission, 2017).

Figure 26: Trend Analysis of British Expenditure on Education (% of GDP)



Source: Data provided by World Bank, 2018

Figure 26 displays expenditures of British government on education from 1992 to 2015, together with estimated values for years 2016 to 2021. The trend analysis shows, that British expenditure on education can be best explained by the polynomial trend function of third degree. The equation of the function is $y = -0.0004x^3 + 0.021x^2 - 0.2112x + 4.9408$ with the coefficient of determination $R^2 = 0.8355$, which means, the expenditures on education in United Kingdom can be explained from about 84% of the polynomial trend.

Future values are determined by the forecast function of MS Excel 2016. The forecasted values for years 2016 - 2021 together with the confidence interval α = 95% are shown in table 7. It can be thus said that the forecasted value of government expenditure on education in 2021 will be with 95% probability between 4.46% and 7.11% of British GDP.

Table 7: UK - Estimated Future Expenditures on Education (% of GDP)

Year	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
LCL	*5.13*	*5.06*	*5.15*	*4.92*	*4.59*	*4.46*
Forecast	**5.59**	**5.65**	**5.89**	**5.83**	**5.73**	**5.79**
UCL	*6.04*	*6.24*	*6.63*	*6.75*	*6.86*	*7.11*

Source: Own calculation based data from World Bank, 2018

5.8.1 Unemployment and Education Expenditure in the United Kingdom

Simple linear regression was used to find out the effect of expenditure of the government on education expressed as the percentage of GDP on unemployment rate in UK expressed as the percentage of the total labour force. The analysed data are from the period 1993-2014. Data set and complete results of linear regression can be found in the appendix.

The coefficient R^2 of the simple linear regression equals to 0.024, indicating that same as in the case of the Netherlands only around 2% of variation in unemployment can be explained by the expenditure on education. Moreover, results are not statistically significant at the level of significance α = 95%, as the Significance F equals 0.49, hence much higher than needed 0.05. Therefore, it can be said that no statistically significant effect of expenditure on education on the unemployment rate has been found.

6 Results and Discussion

Despite the large amount of common policies penetrating many areas within the European Union, each member state oversees its own education policy and each education system is slightly different. To be able to compare different education systems, not only within EU, but around the world, the UNESCO designed the International Standard Classification of Education (ISCED) from ISCED 0 (early childhood education) to ISCED 8 (doctoral or equivalent level).

The comparison of education systems of selected eight European countries (Czech Republic, Poland, Croatia, Romania, Italy, Germany, Netherlands and United Kingdom) shows that most of the differentiation among the systems can be found in education on ISCED levels 3 to 6 (upper secondary education to bachelor's level). The most intricate education system can be thus found in Germany, followed by Netherlands. Germany has five different types of schools on ISCED 2 level, four types on ISCED 3 level and five different types of schools on ISCED 6 and 7 levels. The Dutch education system on the other hand is differentiated especially on ISCED 3 (upper secondary education) and ISCED 4 (post-secondary non-tertiary education) levels. From new member countries, the most intricate education system can be found in the Czech Republic. The special category is the education system in United Kingdom, as each part of the monarchy has its own education system.

For comparison of the level of education, the Programme for International Student Assessment (PISA) has been created by the OECD. PISA compares knowledge of 15 years old students in three main categories, science, reading and mathematics. Last PISA tests took place in 2015 and comparing the old and new member states, in general, students from old member countries reached better results than the students from new member states. The top-performing country in 2015 was Netherlands followed by Germany. Being put into context, the two countries with the most complex education systems had the best results in PISA testing. Among the new members, the best performing country was Poland with results even comparable to the Germany. This could be also correlated to the one of the highest expenditures on education among the observed countries in terms of GDP percentage.

Each country has its own specific problems connected to education, although some common signs can be found among the countries. In most countries, educational outcomes are different for students from different socioeconomic background, whether they are students with immigrant background as in case of western countries, or the Roma population as in case mainly of Czech Republic and Romania. Moreover, in Netherlands and the United Kingdom particularly, it is threatened by the lack of thousands of teachers in following decade.

In terms of governmental expenditure on education expressed as the percentage of GDP, it can be said that the old member countries spend more financial resources on education and are thus closer to the EU average, while the new member states spend less of their financial resources on education, especially Romania. Romania is also the only country with significant decrease in educational spending since 2009. Moreover, with the relatively high share of GDP spent on education, together with beforementioned very good results in PISA, Poland fits more to the category of old western countries in terms of education. On the other hand, Italy with its decreasing trend of expenditure on education in recent years and not satisfying PISA results, is closer to the new eastern countries. Furthermore, study of Münich and Protivínský (2013) points out that improvement in PISA results, usually accompanied by the educational reform, leads to significant increase in GDP in long-term period. In case of the Czech Republic, their study shows that if the future Czech educational reform had the same impact as the Polish reform (1999 and 2009), it would increase Czech GDP by 804 billion CZK (approx. 31 billion EUR) in the following eighty years.

The results of trend analysis indicate that for most of the selected countries, the large proportion of the expenditure on education expressed as the percentage of GDP cannot be explained by the trend line, therefore other inputs play role in government decisions on educational spending. Trend analysis of Czech expenditure thus shows that in 1992, expenditure was 3.79% of GDP and 4.09% of GDP in 2013. The future values are thus estimated for years 2014-2019. The predicted value for year 2019 is 4.09% of GDP. Poland as the best performing state among the new member countries spend around 5% of GDP on education in average. While the expenditure was 4.17% of GDP in 1992, the predicted value year 2020 is 5.09 % of GDP in 2020. Due to the unavailability of most of the data in the observed period, the trend analysis and prediction of future values in Croatia

is not provided. The data unavailability is also reason why the trend analysis of education expenditure in Romania is provided for period 2000-2014. Romania is overall country with lowest expenditure on education among the observed EU states. In 2000, expenditure was only 2.85% of GDP and the predicted value for year 2019 is still only 3.17% of GDP.

Italy, as the worst performing old member country in terms of education spent 4.75% of GDP on education and since then, the trend had been more or less decreasing. The estimated value of expenditure for year 2020 is thus only 4.05% of its GDP. For Germany, same as for Croatia, the trend analysis is not provided due to the unavailability of most of the data. On the other hand, Netherlands is the best performing country in terms of educational output and its expenditure on education has been showing overall increasing trend. In 1993, the expenditure on education was 4.82% of GDP, while the predicted value for 2020 is more than 1% higher, the 5.85% of GDP. The United Kingdom together with Netherlands had been spending the highest share of its GDP on education during the observed period. Despite this fact, the educational outcome in terms of PISA score is not as satisfactory.

Simple linear regression has been used to find out the dependency of unemployment on expenditure on education. For seven out of the eight selected EU countries, de dependency has not been proved, except Germany. Although due to the unavailability of the data for expenditure on education, the examined dataset was for years 2006-2014. Nevertheless, the statistical significance of dependency on unemployment can be explained from about 71% by the regression model.

7 Conclusion

Education plays key role not only in the development of individual, but also in development of countries, and thus increasing the economic outcomes (see Hanushek, 2010). Although, there are many common policies in the European Union, there is no common policy for education. Therefore, each country has its own and slightly different education system.

Within the objective of this thesis was found that among the examined countries, the old member countries have, in general, more complex education systems, than the countries accepted after 2004. Countries with most complex education systems are thus Germany and Netherlands. In the light of this fact, it is not so unexpected that both countries occupy top places in all three categories of 2015 PISA. Moreover, country with highest expenditure and highest PISA score among new member states is Poland.

In terms of expenditure on education, governments of most countries have been usually increasing or keeping their spending stable since 1992. Most of the observed countries has been also sustaining their expenditure in the range from around 4% to 5% of GDP. Romania, on the other hand, is the only country, with expenditure on education equal to around only 3% of GDP in long-term. Related to that, Romania was the worst performing country in 2015 PISA from all eight examined countries.

To support the endogenous theories of growth and the significance of education, the dependency of unemployment on government expenditure on education has been examined. Due to the scope and limitations of this thesis, the statistically significant dependency of unemployment on expenditure on education was found only for one country, Germany. Nevertheless, despite this outcome, the importance of education is undisputable. Education is the key element in reducing poverty or eliminating gender inequality.

"Education is the most powerful weapon which you can use to change the world."

Nelson Mandela

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9 Appendix

1) Regression - Czech Repubic

Regression Statistics		ANOVA						
Multiple R	0.307152		*df*	*SS*	*MS*	*F*	*Significance F*	
R Square	0.094343	Regressio	1	6.278752	6.278752	2.083404	0.164389	
Adjusted R s	0.04906	Residual	20	60.27397	3.013699			
Std. Error	1.736001	Total	21	66.55272				
Observation	22							
	Coeff	*Std. Error*	*t Stat*	*P - value*	*Lower*	*Upper*	*Lower*	*Upper*
Intercept	13.96186	5.377637	2.596281	0.017265	2.744304	25.17941	2.744304	25.1794
X	-1.91415	1.326139	-1.4434	0.164389	-4.68043	0.852128	-4.68043	0.85213
Expenditure	3.79	4.20	4.71	4.56	4.29	3.95	3.61	3.69
Unemploym	2.60	4.30	4.30	4.00	3.90	4.30	5.90	8.50
Expenditure	3.67	3.76	3.99	4.15	4.02	3.90	4.22	3.88
Unemploym	8.80	8.00	7.00	7.50	8.20	7.90	7.20	5.30
Expenditure	3.75	4.18	4.08	4.28				
Unemploym	4.40	6.70	7.30	6.70				

Source: own calculation based on data from World Bank, 2018

2) Regression – Poland

Regression Statistics		ANOVA						
Multiple R	0.215896		*df*	*SS*	*MS*	*F*	*Significance F*	
R Square	0.046611	Regressio	1	15.44397	15.44397	1.026683	0.322472	
Adjusted R squ	0.001211	Residual	21	315.8943	15.04258			
Std. Error	3.878477	Total	22	331.3382				
Observation	23							
	Coeff	*Std. Error*	*t Stat*	*P - value*	*Lower*	*Upper*	*Lower*	*Upper*
Intercept	4.481047	8.437785	0.531069	0.600943	-13.0663	22.02838	-13.0663	22.02838
X	1.704635	1.682338	1.013254	0.322472	-1.79398	5.203249	-1.79398	5.203249
Expenditure	4.17	4.19	4.26	4.33	6.27	5.61	4.95	4.60
Unemployment	13.30	14.00	14.40	13.30	12.40	11.00	9.90	12.30
Expenditure	4.99	5.33	5.40	5.33	5.36	5.43	5.20	4.86
Unemployment	16.30	18.40	19.90	19.40	19.10	17.80	13.80	9.60
Expenditure	5.03	5.00	5.05	4.81	4.81	4.93	4.91	
Unemployment	7.10	8.20	9.60	9.60	10.10	10.30	9.00	

Source: own calculation based on data from World Bank, 2018

3) Regression – Croatia

Regression Statistics		ANOVA						
Multiple R	0.262458		*df*	*SS*	*MS*	*F*	*Significance F*	
R Square	0.068884	Regressio	1.203271	1.20327072	0.221941	0.669705		
Adjusted I	-0.24149	Residual	16.26473	5.42157664				
Std. Error	2.328428	Total	17.468					
Observati	5							
	Coeff	*Std. Error*	*t Stat*	*P - value*	*Lower*	*Upper*	*Lower*	*Upper*
Intercept	25.51798	31.72541	0.804339	0.48003644	-75.4464	126.4824	-75.4464	126.4824
X	-3.55066	7.536857	-0.47111	0.66970508	-27.5363	20.43498	-27.5363	20.43498
Expenditure		3.97	4.27	4.39	4.25	4.15		
Unemployment		9.90	8.50	9.20	11.60	13.70		

Source: own calculation based on data from World Bank, 2018

4) Regression – Romania

Regression Statistics		ANOVA						
Multiple R	0.368829157		*df*	*SS*	*MS*	*F*	*Significance F*	
R Square	0.136034947	Regressio	1	0.534526632	0.534527	2.046905	0.176112	
Adjusted R squ	0.069576097	Residual	13	3.394806557	0.261139			
Std. Error	0.511017579	Total	14	3.929333188				
Observation	15							

	Coeff	*Std. Error*	*t Stat*	*P - value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	8.397689666	0.990414	8.478965	1.17647E-06	6.258029	10.53735	6.258029	10.53735
X	-0.40895636	0.285843	-1.4307	0.176111992	-1.02648	0.208571	-1.02648	0.208571
Expenditure	2.85	3.25	3.49	3.42	3.26	3.46	3.84	4.23
Unemploymer	7.00	6.60	8.10	7.00	7.70	7.20	7.30	6.40
Expenditure	4.19	4.16	3.46	3.03	2.95	2.80	3.13	
Unemploymer	5.80	6.90	7.00	7.20	6.80	7.10	6.80	

Source: own calculation based on data from World Bank, 2018

5) Regression – Germany

Regression Statistics		ANOVA					
Multiple F	0.839888		*df*	*SS*	*MS*	*F*	*Significance F*
R Square	0.705412	Regressio	1	17.6933	17.6933	16.76199	0.004607
Adjusted I	0.663328	Residual	7	7.388923	1.05556		
Std. Error	1.027405	Total	8	25.08222			
Observati	9						

	Coeff	*Std. Error*	*t Stat*	*P - value*	*Lower*	*Upper*	*Lower*	*Upper*
Intercept	31.84502	6.091637	5.227663	0.001216	17.44059	46.24946	17.44059	46.24946
X	-5.27738	1.289007	-4.09414	0.004607	-8.32539	-2.22936	-8.32539	-2.22936
Expenditu	4.29	4.35	4.41	4.88	4.91	4.81	4.93	4.93
Unemploy	10.20	8.70	7.50	7.70	7.00	5.80	5.40	5.20
Expenditu	4.95							
Unemploy	5.00							

Source: own calculation based on data from World Bank, 2018

6) Regression – Italy

Regression Statistics		ANOVA					
Multiple R	0.025238		*df*	*SS*	*MS*	*F*	*Significance F*
R Square	0.000637	Regressio	1	0.056572	0.056572	0.012747	0.911232
Adjusted I	-0.04933	Residual	20	88.75843	4.437921		
Std. Error	2.106637	Total	21	88.815			
Observati	22						

	Coeff	*Std. Error*	*t Stat*	*P - value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	11.01333	11.1984	0.983474	0.337123	-12.3461	34.37279	-12.3461	34.37279
X	-0.28786	2.549588	-0.1129	0.911232	-5.60621	5.030488	-5.60621	5.030488
Expenditu	4.75	4.45	4.33	4.47	4.46	4.45	4.53	4.30
Unemploy	10.20	11.10	11.70	11.90	12.00	12.10	11.70	10.80
Expenditu	4.66	4.43	4.56	4.39	4.25	4.53	4.12	4.41
Unemploy	9.60	9.20	8.90	7.90	7.70	6.80	6.10	6.70
Expenditu	4.54	4.36	4.14	4.16	4.18	4.08		
Unemploy	7.80	8.40	8.40	10.60	12.20	12.70		

Source: own calculation based on data from World Bank, 2018

7) Regression – Netherlands

Regression Statistics		ANOVA					
Multiple R	0.136453		*df*	*SS*	*MS*	*F*	*Significance F*
R Square	0.018619	Regressio	1	1.105693	1.105693	0.379455	0.544843
Adjusted I	-0.03045	Residual	20	58.27794	2.913897		
Std. Error	1.707014	Total	21	59.38364			
Observati	22						

	Coeff	*Std. Error*	*t Stat*	*P - value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	1.653754	5.002739	0.33057	0.744407	-8.78178	12.08929	-8.78178	12.08929
X	0.612728	0.994689	0.615999	0.544843	-1.46216	2.687612	-1.46216	2.687612
Expenditu	4.82	4.73	4.64	4.54	4.57	4.60	4.56	4.63
Unemploy	6.30	7.20	7.20	6.40	5.50	4.40	3.60	2.70
Expenditu	4.75	4.87	5.10	5.11	5.16	5.09	4.94	5.09
Unemploy	2.10	2.60	3.60	4.60	4.70	3.90	3.20	2.80
Expenditu	5.49	5.55	5.53	5.48	5.59	5.53		
Unemploy	3.40	4.40	5.00	5.80	7.20	7.40		

Source: own calculation based on data from World Bank, 2018

8) Regression – United Kingdom

Regression Statistics		ANOVA					
Multiple R	0.155231		*df*	*SS*	*MS*	*F*	*Significance F*
R Square	0.024097	Regressio	1	1.653839	1.653839	0.493836	0.490321
Adjusted I	-0.0247	Residual	20	66.97934	3.348967		
Std. Error	1.830018	Total	21	68.63318			
Observati	22						

	Coeff	*Std. Error*	*t Stat*	*P - value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	4.264712	3.686666	1.156794	0.260987	-3.42554	11.95496	-3.42554	11.95496
X	0.532416	0.757635	0.702734	0.490321	-1.04798	2.112815	-1.04798	2.112815
Expenditu	4.33	4.59	4.85	4.84	4.46	4.36	4.27	4.06
Unemploy	9.80	10.40	9.60	8.70	8.20	7.10	6.20	6.00
Expenditu	4.11	4.18	4.72	4.89	4.81	5.02	5.04	4.97
Unemploy	5.60	4.70	5.00	4.80	4.60	4.80	5.40	5.30
Expenditu	4.96	5.17	5.81	5.71	5.67	5.64	5.73	
Unemploy	5.60	7.50	7.80	8.00	7.90	7.50	6.10	

Source: own calculation based on data from World Bank, 2018

9) Expenditure on Education by Country (% of GDP)

Country	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
DEU		4.41	4.34	4.42	4.47		4.45								4.29	4.35	4.41	4.88	4.91	4.81	4.93	4.93	4.95	
ITA		4.75	4.45	4.33	4.47		4.45	4.53	4.30	4.66	4.43	4.56	4.39	4.25	4.53	4.12	4.41	4.54	4.36	4.14		4.18	4.08	
GBR	4.33		4.85	4.84	4.46		4.27	4.06	4.11	4.18	4.72	4.89	4.81	5.02	5.04	4.97	4.96	5.17	5.81	5.71		5.64	5.73	5.68
NLD		4.82	4.73	4.64	4.54		4.60	4.56	4.63	4.75	4.87	5.10	5.11	5.16	5.09	4.94	5.09	5.49	5.55	5.53	5.48	5.59	5.53	
CZE	3.79	4.20	4.71	4.56	4.29		3.61	3.69	3.67	3.76	3.99	4.15	4.02	3.90	4.22	3.88	3.75	4.18	4.08	4.28	4.25	4.09		
HRV											3.80	3.87	3.82			3.97	4.27	4.39	4.25	4.15		4.58	4.70	4.71
POL	4.17	4.19		4.33	6.27		4.95	4.60	4.99	5.33	5.40	5.33	5.36	5.43	5.20	4.86	5.03	5.00	5.05	4.81	4.81	4.93	4.91	
ROU					3.22				2.85	3.25	3.49	3.42	3.26	3.46		4.23		4.16	3.46	3.03	2.95	2.80	3.13	
EUU	5.00	4.95	4.73	4.76	4.65			4.53	4.59	4.88	5.24	5.22	5.10	5.05	5.06	5.07	4.86	5.06	5.57	5.40	5.12	4.96	5.31	5.29

Source: Data provided by World Bank, 2018