BASIC SKILLS OF STUDENTS: READING, MATHEMATICS AND SCIENCE

Carmen Valentina RĂDULESCU^{a}, Sorin Petrică ANGHELUȚĂ^b,
Sorin BURLACU^c, Victor Adrian TROACĂ^d*

a, b, c, d Bucharest University of Economic Studies, Romania

ABSTRACT

Reading, math and science are basic skills that students acquire in school. The level of these basic skills is an important indicator of the quality of initial education and training systems. The basic competences acquired in primary and lower secondary education are assessed. The authors propose the analysis of the evolution of underachievement indicators in reading, mathematics and science in the member countries of the European Union, for the period 2006-2018. The level of education can be influenced by the existence in a community of students with poor results, associated with the existence of students with special educational needs.

KEYWORDS: *basic skills, education, European Union.*

DOI: 10.24818/IMC/2021/02.14

1. INTRODUCTION

Reading, math and science are basic skills that students acquire in school. The level of these basic skills is an important indicator of the quality of initial education and training systems. Through the International Student Assessment Program (PISA), the basic skills acquired in primary and lower secondary education are assessed.

The acquisition of basic skills requires different approaches from countries. It is noted that measures are needed to reduce poor performance in reading, mathematics and science.

The existence in a community of students with poor results, associated with the existence of students with special educational needs, decreases the level of education. Hence, a low level of education makes it possible to manifest a disadvantaged socio-economic environment for that community. In this context, in order to develop the potential and to integrate these students in the community, it is necessary to be aware of the role that vocational education and training systems play (Androniceanu & Burlacu, 2017).

It is hoped that students' performance will not be influenced by their socio-economic status or if there is an influence it will have as little impact as possible (Stoica & Burlacu, 2017). Also, in order to increase student performance, the quality of teacher training is very important (Burlacu & Neagu, 2007).

The acquisition by students of those skills related to entrepreneurship, respectively the relevant skills that will allow them to occupy jobs, can be achieved only on the basis of access to quality education (Burlacu et al., 2013).

In some cases, students' educational performance may worsen when they use digital devices in the classroom (Ravizza et al., 2017). Thus, there is no correlation between students achieving improved school results based on the use of digital technology (Burlacu et al., 2018).

* Corresponding author. E-mail address: carmen-valentina.radulescu@eam.ase.ro

It is also desirable that in the classroom the use of the computer be made in moderation and only for educational purposes (Vázquez-Cano et al., 2020). Students' attitude towards educational processes is also influenced by the degree of school experience that their parents have (Barg, 2019).

Applying long-term planning strategies for investment in education can help increase productivity (Rupnik and Avsec, 2020). It is found, however, that the application of different training practices is closely related to different learning environments (Asunda and Quintana, 2018).

Thus, young people can benefit from additional opportunities by applying measures that lead to an improved quality of education and training processes (EC, 2016). Learning models that rely on cooperation between peers can lead to considerably improved school outcomes (Pulgar et al., 2020).

2. RESULTS AND DISCUSSIONS

Creating quality, well-paid jobs cannot be based on graduates who do not have the basic skills. Also, the personal fulfillment and well-being of the members of a community can contribute to the development and prosperity of that community.

The opportunities that students can benefit from after graduation can be reduced if they have underachievement in reading, mathematics and science. The following table presents the comparative situation of underachievement in reading for 15-year-old students, in the period 2006-2018 (%).

Table 1. Comparative situation of underachievement in reading for 15-year-old students, in the period 2006-2018 (%)

Countries	2006	2009	2012	2015	2018
Belgium	19.4	17.7	16.1	19.5	21.3
Bulgaria	51.1	41.0	39.4	41.5	47.1
Czechia	24.8	23.1	16.9	22.0	20.7
Denmark	16.0	15.2	14.6	15.0	16.0
Germany	20.0	18.5	14.5	16.2	20.7
Estonia	13.6	13.3	9.1	10.6	11.1
Ireland	12.1	17.2	9.6	10.2	11.8
Greece	27.7	21.3	22.6	27.3	30.5
Spain	25.7	19.6	18.3	16.2	:
France	21.7	19.8	18.9	21.5	20.9
Croatia	21.5	22.4	18.7	19.9	21.6
Italy	26.4	21.0	19.5	21.0	23.3
Cyprus	:	:	32.8	35.6	43.7
Latvia	21.2	17.6	17.0	17.7	22.4
Lithuania	25.7	24.4	21.2	25.1	24.4
Luxembourg	22.9	26.0	22.2	25.6	29.3
Hungary	20.6	17.6	19.7	27.5	25.3
Malta	:	36.3	:	35.6	35.9
Netherlands	15.1	14.3	14.0	18.1	24.1
Austria	21.5	:	19.5	22.5	23.6
Poland	16.2	15.0	10.6	14.4	14.7
Portugal	24.9	17.6	18.8	17.2	20.2
Romania	53.5	40.4	37.3	38.7	40.8
Slovenia	16.5	21.2	21.1	15.1	17.9
Slovakia	27.8	22.2	28.2	32.1	31.4
Finland	4.8	8.1	11.3	11.1	13.5
Sweden	15.3	17.4	22.7	18.4	18.4
United Kingdom	19.0	18.4	16.6	17.9	17.3

Source: made by the authors based on existing data on the EUROSTAT website (2021)

From the comparative situation presented, it is observed that underachievement in reading increased in 2018 compared to 2006 in: Luxembourg (+ 6.4%), Hungary (+ 4.7%), Netherlands (+ 9.0%), Slovakia (+ 3.6%), Finland (+ 8.7%). Significant decreases in values are recorded in: Bulgaria (-4.0%), Czech Republic (-4.1%), Estonia (-2.5%), Italy (-3.1%), Portugal (-4.7 %), Romania (-12.7%). However, in 2018 the countries where over a third of 15-year-old students have underachievement in reading are: Bulgaria (47.1%), Greece (30.5%), Cyprus (43.7%), Luxembourg (29.3%), Malta (35.9%), Romania (40.8%), Slovakia (31.4%). Less than 15% of 15-year-olds have underachievement in reading in: Estonia (11.1%), Ireland (11.8%), Poland (14.7%), Finland (13.5%).

The following table presents the comparative situation of underachievement in mathematics for the period 2006-2018 (%).

Table 2. Comparative situation of underachievement in mathematics for 15-year-old students, in the period 2006-2018 (%)

Countries	2006	2009	2012	2015	2018
Belgium	17.5	19.1	19.0	20.1	19.7
Bulgaria	53.4	47.1	43.8	42.1	44.4
Czechia	19.3	22.4	21.0	21.7	20.4
Denmark	13.7	17.1	16.8	13.6	14.6
Germany	20.0	18.7	17.7	17.2	21.1
Estonia	12.1	12.7	10.5	11.2	10.2
Ireland	16.5	20.9	16.9	15.0	15.7
Greece	32.5	30.4	35.7	35.8	35.8
Spain	24.8	23.8	23.6	22.2	24.7
France	22.4	22.5	22.4	23.5	21.3
Croatia	28.7	33.2	29.9	32.0	31.2
Italy	33.0	25.0	24.7	23.3	23.8
Cyprus	:	:	42.0	42.6	36.9
Latvia	20.8	22.6	19.9	21.4	17.3
Lithuania	23.1	26.4	26.0	25.4	25.6
Luxembourg	22.9	23.9	24.3	25.8	27.2
Hungary	21.2	22.3	28.1	28.0	25.6
Malta	:	33.7	:	29.1	30.2
Netherlands	11.6	13.4	14.8	16.7	15.8
Austria	20.1	:	18.7	21.8	21.1
Poland	20.0	20.5	14.4	17.2	14.7
Portugal	30.9	23.8	24.9	23.8	23.3
Romania	52.9	47.0	40.8	39.9	46.6
Slovenia	17.8	20.4	20.1	16.1	16.4
Slovakia	21.0	21.0	27.5	27.7	25.1
Finland	6.0	7.9	12.3	13.6	15.0
Sweden	18.4	21.1	27.1	20.8	18.8
United Kingdom	19.9	20.2	21.8	21.9	19.2

Source: made by the authors based on existing data on the EUROSTAT website (2021)

It is observed that in 2018, compared to 2006, the values decreased in: Bulgaria (-9.0%), Italy (-9.2%), Latvia (-3.5%), Poland (-5.3%), Portugal (-7.6%), Romania (-6.3%). Also, the most significant increases in values were registered in: Greece (+3.3%), Luxembourg (+4.3%), Hungary (+4.4%), Netherlands (+4.2%) , Slovakia (+4.1%), Finland (+9.0%). In 2018, the countries where

over a third of 15-year-old students have underachievement in mathematics are: Bulgaria (44.4%), Greece (35.8%), Croatia (31.2%), Cyprus (36.9%), Malta (30.2%), Romania (46.6%). Less than 15% of 15-year-old students have underachievement in mathematics in: Denmark (14.6%), Estonia (10.2%), Poland (14.7%), Finland (15.0%).

Table 3. Comparative situation of underachievement in science for 15-year-old students, in the period 2006-2018 (%)

Countries	2006	2009	2012	2015	2018
Belgium	17.0	18.0	17.7	19.8	20.0
Bulgaria	42.6	38.8	36.9	37.9	46.5
Czechia	15.5	17.3	13.8	20.7	18.8
Denmark	18.4	16.6	16.7	15.9	18.7
Germany	15.4	14.8	12.2	17.0	19.6
Estonia	7.7	8.3	5.0	8.8	8.8
Ireland	15.5	15.2	11.1	15.3	17.0
Greece	24.0	25.3	25.5	32.7	31.7
Spain	19.6	18.2	15.7	18.3	21.3
France	21.2	19.3	18.7	22.1	20.5
Croatia	17.0	18.5	17.3	24.6	25.4
Italy	25.3	20.6	18.7	23.2	25.9
Cyprus	:	:	38.0	42.1	39.0
Latvia	17.4	14.7	12.4	17.2	18.5
Lithuania	20.3	17.0	16.1	24.7	22.2
Luxembourg	22.1	23.7	22.2	25.9	26.8
Hungary	15.0	14.1	18.0	26.0	24.1
Malta	:	32.5	:	32.5	33.5
Netherlands	13.0	13.2	13.1	18.5	20.0
Austria	16.3	:	15.8	20.8	21.9
Poland	17.0	13.1	9.0	16.3	13.8
Portugal	24.5	16.5	19.0	17.4	19.6
Romania	46.9	41.4	37.3	38.5	43.9
Slovenia	13.9	14.8	12.9	15.0	14.6
Slovakia	20.2	19.3	26.9	30.7	29.3
Finland	4.1	6.0	7.7	11.5	12.9
Sweden	16.4	19.1	22.2	21.6	19.0
United Kingdom	16.7	15.0	15.0	17.4	17.4

Source: made by the authors based on existing data on the EUROSTAT website (2021)

In 2018, the countries where over a third of 15-year-old students have underachievement in science are: Bulgaria (46.5%), Greece (31.7%), Cyprus (39.0%), Malta (33.5%), Romania (43.9%), Slovakia (29.3%). Less than 15% of 15-year-old students have underachievement in science in: Estonia (8.8%), Poland (13.8%), Slovenia (14.6%), Finland (12.9%). It is also noted that in 2018, compared to 2006, the values decreased in: France (-0.7%), Poland (-3.2%), Portugal (-4.9%), Romania (-3.0%). Also, the most significant increases in values were registered in: Greece (+7.7%), Croatia (+8.4%), Hungary (+9.1%), Netherlands (+7.0%), Austria (+5.6%), Slovakia (+9.1%), Finland (+8.8%).

From the analysis, it can be concluded that, in 2018, in some countries educational underachievement has high values for all indicators (reading, mathematics, science). In the following countries over a third of 15-year-old students have underachievement for reading,

mathematics and science: Bulgaria, Cyprus, Greece, Malta and Romania. Figure 1 shows the comparative situation of the values for the 3 indicators in these countries.

Figure 1. The comparative situation of values for reading, mathematics, science in Bulgaria, Cyprus, Greece, Malta and Romania

Source: made by the authors based on existing data on the EUROSTAT website (2021)

Considering the values from the previous figure, we notice that the countries where underachievement for reading, mathematics and science have the highest values are: Bulgaria and Romania.

At the same time, less than 15% of 15-year-old students have underachievement for reading, mathematics and science in: Estonia, Finland and Poland. The following figure shows the comparative analysis for these countries.

Figure 2. The comparative situation of values for those reading, mathematics, science in Estonia, Finland and Poland

Source: made by the authors based on existing data on the EUROSTAT website (2021)

From the data presented in this figure, it is observed that in Estonia the lowest values of the 3 indicators (underachievement for reading, mathematics and science) are registered.

3. CONCLUSIONS

Their participation in education and training programs also contributes to increasing the level of skills of graduates. Bringing educational processes closer to the labor market is a more common requirement. In this way, there are changes in working methods in the teaching of disciplines (Chari and Potvin, 2019).

From the analysis, it can be concluded that, in 2018, in some countries educational underachievement has high values for all indicators (reading, mathematics, science). In Bulgaria, Cyprus, Greece, Malta and Romania over a third of 15-year-old students have: underachievement for reading, mathematics and science. Also, in terms of the three indicators, the results are better: Estonia, Finland and Poland.

The need for education of students is influenced by economic and social characteristics, but also by demographic characteristics. The education they received, as well as its quality, contributes to the performance of graduates. In situations that require change, the acquisition of relevant civic, social and entrepreneurial skills can lead to increased capacity to adapt to these changes (OECD, 2019).

Underachievement in reading, maths and science can lead to marginalization and social exclusion, respectively. It is considered that participation in education and training programs contributes to the elimination of these negative manifestations (ECA, 2017).

REFERENCES

- Androniceanu, A., & Burlacu, S. (2017). Integration of Educational Technologies in Universities and Students' Perception Thereof. In *The International Scientific Conference eLearning and Software for Education* (Vol. 2, p. 26). "Carol I" National Defence University.
- Androniceanu, A., & Burlacu, S. (2017). Intelligent System for Assessment and Grading Based on Docimologic Tests. *eLearning & Software for Education*, 2.
- Asunda, P. A., & Quintana, J. (2018). Positioning the T and E in STEM: A STL Analytical Content Review of Engineering and Technology Education Research. *Journal of Technology Education*, 30(1).
- Barg, K. (2019). Why are middle-class parents more involved in school than working-class parents? *Research in Social Stratification and Mobility*, 59, 14–24.
- Burlacu, S., & Neagu, C. (2007) E-Learning or Electronic Systems of Training. *Management And Marketing*, 823.
- Burlacu, S., Rădulescu, C. V., & Bălu, O. F. (2018). Forms of Electronic Training. Principles of Educational Games. In *Proceedings Of The International Conference on Economics and Social Sciences* (Vol. 1, pp. 36-41). *Bucharest University of Economic Studies, Romania*.
- Chari, D., & Potvin, G. (2019). Understanding the importance of graduate admissions criteria according to prospective graduate students. *Physical Review Physics Education Research*, 15, 023101.
- European Commission (2016). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 'Next steps for a sustainable European future European action for sustainability'*
- European Court of Auditors (2017). *Special report No 5/2017: Youth unemployment – have EU policies made a difference?* Retrieved June 30, 2021, from: <https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=41096>.
- EUROSTAT. (2021). <http://ec.europa.eu/eurostat>
- Organization for Economic Cooperation and Development (2019). *Trends Shaping Education 2019*, OECD Publishing, Paris. Retrieved June 27, 2021, from: https://read.oecd-ilibrary.org/education/trends-shaping-education-2019_trends_edu-2019-en.

- Pulgar, J., Candia, C., & Leonardi, P. M. (2020). Social networks and academic performance in physics: Undergraduate cooperation enhances ill-structured problem elaboration and inhibits well-structured problem solving. *Physical Review Physics Education Research*, 16, 010137.
- Ravizza, S. M., Uitvlugt, M. G., Fenn, K. M. (2017). Logged In and Zoned Out: How Laptop Internet Use Relates to Classroom Learning. *Psychological Science*, 28(2), 171-180.
- Rupnik, D., & Avsec, S. (2020). Effects of a transdisciplinary educational approach on students' technological literacy. *Journal of Baltic Science Education*, 19(1), 121-141.
- Stoica, M. M., & Burlacu, S. (2017) Concepts and Trends on E-Learning in Romania. *The International Journal of Engineering And Science (IJES)*, 6(3), 100-105, ISSN (e): 2319 – 1813 ISSN (p): 2319 – 1805
- Vázquez-Cano, E., Gómez-Galán, J., Infante-Moro, A., & López-Meneses, E. (2020). Incidence of a Non-Sustainability Use of Technology on Students' Reading Performance in Pisa. *Sustainability*, 12, 749.