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Functional Illiteracy: Barrier to the Sustainable Development of Romania – Republic of Moldova Cross-Border Area

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ABSTRACT

Amid computer science advancements, a major problem many states deal with is, paradoxically, functional illiteracy. This phenomenon accounts for socio-educational and economic problems of contemporary society that, if unsolved, in the medium and long term, can have serious effects on the future development of societies. The prevention and fight against functional illiteracy require specialized mobilization, on multiple sectors. On the PISA 2022 performance scale, the share of students with low performance in basic skills remains high, 42% for Romania and 44.3% for the Republic of Moldova (among the highest in the European Union). If the European Union is aiming to lower the functional illiteracy rate among 15-year-olds to below 15% by 2020, Romania and the Republic of Moldova are far from such an ambitious target. Both countries are aiming to lower this rate to 25% by 2030. In this context, a large part of future generations in the two countries are functionally and socially illiterate due to the lack of primary education, which will be a catastrophe for the labour market, businesses and economy in the future. We present a brief analysis of the functional illiteracy characteristics in Romania and in the Republic of Moldova among 15-year-old students. A comparative analysis of the functional illiteracy rates of students in the two countries, considering the PISA test in the period 2006–2022, was conducted, as well as of this phenomenon's effects on the future development of these countries, in general, and on the cross-border area, in particular.

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1. Introduction

The world is currently under constant change, becoming more complex, interconnected and fluid. In this context, education must rise to a level that can provide graduates and society with maximum opportunities and options.

The level and quality of education are affected by the degree reached by functional illiteracy and by the formulation/reformulation of reforms/policies based on scientific data on education, that should respond to the challenges identified at national and international level, in the sense of transfer of competences, adapted to the needs of today's and tomorrow's society.

One of the largest studies in the world on the state of education worldwide (in terms of student performance in Science, Reading and Mathematics tests) is also the OECD Program for International Student Assessment: PISA. A comprehensive set of indicators are collected in this program, for comparison and analysis, covering student performance, attitudes toward learning, school environment and resources and many other aspects of school life.

The reports drafted by the Organization for Economic Cooperation and Development (OECD) in 2022 on the state of education worldwide in terms of student performance in the Science tests (as a priority field), Reading and Mathematics (as secondary fields), ranked Romania and the Republic of Moldova on the 41st and 45th place, respectively, out of 81 participating countries worldwide.

The causes of functional illiteracy are multiple and complex, being at the crossroads between the individual and social environment, the individual and economic, cultural, educational, political environments. Characteristically for this phenomenon is the fact that it is not specific to a single age group (it can be identified in both students, young persons and adults) and has a heterogeneous territorial distribution.

Whereas in Romania, in the communist period, up until 1956, illiteracy was almost eradicated, in 2021 the rate of school dropout was 13.6% at the level of primary education. According to the Global Childhood Report 2021, in the Republic of Moldova, the school dropout rate was 17.1%, being the highest at European level.

In the current context, the main factor leading to such a high illiteracy threshold is poverty. The economic downturn and health crisis, the increasingly higher unemployment rate, the lack of jobs, are just some of the factors that have led to the increase in the level of poverty among the population, and implicitly to growing illiteracy, school dropout and early leaving of the educational system. Alongside with poverty, other reasons for illiteracy or school dropout should be mentioned, i.e. cultural and social causes, as well as the lack of values in society.

Functional illiteracy, school dropout and early leaving of the educational system are complex and multidimensional social phenomena, generated by both individual/family factors, as well as economic, social and educational factors. These phenomena can have medium and long-term consequences, with negative effects on future employment outcomes and salary earnings, as well as negative consequences on public physical and mental health. They can also lead to drug abuse, involvement in criminal activities, disengagement from life and society, and over a longer period of time, large varieties of social conditions can appear: isolation, employment under insecure conditions and in exchange for low wages, criminal activity and physical and mental health problems, not starting a family, divorce, etc.

Increasing the positive attitude toward school and strengthening the motivation for learning among students, both at European level, as well as in Romania and the Republic of Moldova must be correlated to the economic reasoning, according to which the knowledge-based society and the economic globalization will function effectively and will progress only if the young generations entering the labour market are equipped with solid knowledge and practical skills that, throughout their lives, can be transferred to different contexts of learning and professional activity.

2. Functional Illiteracy: Conceptual Approaches, Characteristics, Causes

In 1949, the United Nations Educational, Scientific and Cultural Organization (UNESCO) recognized the ability to read and write as a fundamental right (Bhola, 1995; Vágvölgyi et al., 2016). This recognition led in the following years to the need for a clear and operational definition to delineate literate and illiterate people, as well as to the identification of different levels of competence.

In 1978, the UNESCO General Conference stated: "A person is literate who can with understanding both read and write a short simple statement related to his/her everyday life. A person is illiterate who cannot with understanding read and write a short simple statement related to his/her everyday life. A person is functionally literate who can engage in all those activities in which literacy is required for effective functioning of his/her group and community and also for enabling him/her to continue to use reading, writing and calculation for his/her own and the community's development. A person is functionally illiterate who cannot engage in all those activities in which literacy is required for the effective functioning of his/her group and community and also cannot use reading, writing and calculation for his/her own and the community's development." (UNESCO, 1978, p. 183).

In the 21st century, the concept of functional illiteracy has been extended to numerous activities that characterize contemporary society. For example, Bugaievska (2012) distinguished the following forms of functional literacy: general literacy, computer literacy, language proficiency, informational and communicative literacy, household literacy, emerging behaviour literacy, socio-political literacy. Voronovych (2019) also included general legal and professional literacy, environmental literacy, civic literacy (ability to assess the political and economic situation and make appropriate decisions).

Literature on functional illiteracy has proposed various definitions and standards for assessing the level of this phenomenon. Beyond PIAAC, ALL and IALS, PISA (for estimating the number of functional illiterates in various age groups), other studies used the years of study to measure functional illiteracy (Bhola, 1995; Martinez & Fernandez, 2010; Vágvölgyi et al., 2016) or developmental delay (Eme, 2011; Rüsseler et al., 2013). Functional illiteracy is often confused with illiteracy itself (Thompson & Binder, 2003) or a sample is called "functional illiterate" without any justification (van Linden & Cremers, 2008; Kosmidis et al., 2011). In this context, the overall picture of functional illiteracy assessment is particularly problematic, which can make any estimate relative.

Since 1967, the annual International Literacy Day (ILD) celebrations have been held around the world on September 8th, to remind policy makers, practitioners and the public of the critical importance of literacy. Literacy is a fundamental human right, and it opens the door to enjoying other human rights, greater freedoms, and global citizenship. Literacy is also a basis for people to acquire broader knowledge, skills, values, attitudes and behaviours to promote a sustainable peace culture based on respect for equality and non-discrimination, the rule of law, solidarity, justice, diversity and tolerance, and to build harmonious relationships with the self, other people and with the planet. And yet, shockingly, over 796 million people in the world cannot read and write (Final Report from the World Literacy Foundation, 2023). Around 67 million children do not have access to primary education and another 72 million miss secondary education.

If one starts from the definition of functional illiteracy given in 1978 by UNESCO, then it can be said that it refers to the reduced ability of a person to transpose into daily life the information acquired during school years. In this context, functional illiteracy is also perceived as a missed opportunity to learn and acquire the necessary skills for development in the information society.

The *skills* that a functional literate should possess relate to three broad dimensions:

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▪ *reading and understanding* of a written text (making logical connections, extracting main ideas, expressing a point of view);

▪ *mathematical literacy* (the ability to translate abstract information into daily activities – shopping, etc.);

▪ *scientific literacy* (the ability to understand phenomena in nature and make decisions based on factual data).

Among the *characteristics* of functional illiteracy, the following can be mentioned:

▪ it is not a problem limited exclusively to young people, it rather affects all age groups;

▪ its territorial distribution is complex and heterogeneous;

▪ functional illiteracy affects both employed people, as well as those excluded from the labour market;

▪ it is a phenomenon that unequally affects men and women of different age segments;

▪ many persons affected by functional illiteracy adopt avoidance strategies to hide these shortcomings;

▪ functional illiteracy is a factor of exclusion and poverty that prevents people from conducting a professional activity, limits their participation in democratic and social life, and seriously affects personal achievement and the safeguarding of their own rights.

The *factors* leading to functional illiteracy are both *individual* (attention disorders, dyslexia, intellectual impairments, physical, sensory, motor and somatic disabilities, factors at the level of psycho-social development of the person, etc.) as well as *socio-economic and cultural* factors (poverty, unemployment, family conflicts, family violence, dramatic family events, ethnicity, religious beliefs, etc.).

The most eloquent results on functional illiteracy among 15-year-olds are provided by PISA testing. PISA investigates the "basic skills" in three major areas: Reading, Mathematics and Science, so-called *literacy in reading, mathematics and science*.

Up to the present date, data has been collected in 2000, 2003, 2006, 2009, 2012, 2015, 2018 and 2022, with each cycle ending with the publication of reports to present the results. Since the first round of PISA assessment and up to the present day, more than 80 countries and economies have participated, 50 of them being countries with mean incomes. In addition to the three core areas – reading, mathematics and Science – PISA testing also targets an innovative field, which in 2022 was creative thinking.

The PISA results are used by policy makers in many parts of the world either to assess the competences of students in their own country compared to those of students in other participating countries/economies, or to establish benchmarks for improving the quality of education, or to understand the strengths and weaknesses of educational policies implemented up to the assessment date.

3. Functional Illiteracy in Romania and in the Republic of Moldova

The PISA 2022 assessment focused on Mathematics as the main field, with Reading and Science as the secondary fields and Creative Thinking as the innovative field. An assessment of the financial literacy among young people was included in the PISA 2022 program for the participating countries and economies.

Approximately 690,000 students completed the PISA assessment in 2022, accounting for approximately 29 million 15-year-olds in schools from the 81 participating countries/economies.

A number of 73,640 15-year-old students from Romania, at the level of middle school and high school from 262 countrywide school institutions, and about 6,803 students from the Republic of Moldova from 265 education institutions participated in the PISA 2022 assessment.

Thus, in 2022, on the *Mathematics general scale* (main field of PISA 2022), the two countries recorded close average scores:

- Romania: 428 points, 2 points down as compared to 2018, but 6 points up as compared to the testing in the year 2000. With this score, in 2022, Romania ranked 41 out of 81 countries/economies with validated databases;
- Republic of Moldova: 414 points (dropping by 7 as compared to PISA 2018), a level similar to that of students in Cyprus, Bulgaria, Qatar, Chile, Uruguay, Malaysia.

On the *Reading general scale* (secondary field of PISA 2022), Romania registered an average score of 428 points (up by only 1 point as compared to the 2018 testing, and down by 10 points as compared to 2012), with a 10-year average tendency of the average performance (2012-2022) amounting to -9.7.

In the same field, students from the Republic of Moldova obtained an average score of 411 points (as compared to 424 points at PISA 2018), the 10-year average tendency of the average performance (2012-2022) amounting to -8.8.

In the second secondary field of Pisa 2022, Science, Romania scored an average score of 428 points, two points less than in 2018, and 11 points less than in Pisa 2009. In these circumstances, Romania had similar performances in 2022 to countries such as Uruguay, Qatar, United Arab Emirates, Kazakhstan, Bulgaria.

Students from the Republic of Moldova have accumulated 417 points in the Science field, down by 7 points compared to the PISA 2018 test, which places the Republic of Moldova at the same level of performance in this field as Bulgaria, Malaysia, Mongolia, Colombia, Costa Rica.

On the PISA 2022 performance scale, seven levels of skills have been defined, of which:

- level 2 (over 420 points) is considered to be the basic level that needs to be reached by a 15-year-old before completing compulsory education, in order to be able to function effectively in the knowledge-based society;
- level 5 (over 607 points) encompasses those students who can use abstract scientific ideas or concepts to explain unfamiliar and more complex phenomena, events and processes involving multiple causal connections;
- level 6 (over 669 points), where students can solve abstract problems and demonstrate creativity and flexible thinking in elaborating solutions.

In the field of Science and Reading, PISA 2022, 46.5% and, respectively, 41.1% of the Romanian students registered competence levels below level 2, and 0.5% and, respectively, 1.91% of the Romanian students performed at levels 5 and 6. In the field of Mathematics, 47% of students scored below level 2 of competence and 4.0% performed at levels 5 and 6.

In terms of the performance of students from the Republic of Moldova, in Science and Reading, PISA 2022, 40.8% and, respectively, 41.1% of them ranked below the level of competence 2, and 1.4% and, respectively, 0.5% performed at the higher levels. In Mathematics, 55.2% of pupils in the Republic of Moldova scored results below level 2 and 1.2% performed above level 5.

The results of PISA assessments highlight that by 2015 there is a slight decrease in the percentage of Romanian students ranking levels below 2 (students who can perform actions that are almost always obvious or require a minimum information synthesis, but in all cases the actions result immediately from the given stimuli; they are able to perform simple calculations with integers and to follow a clear instruction describing a single step or a single operation) in all the fields (with 2.9 pp in Science, 1.7 pp in Reading and 7.13 pp in Mathematics) (Fig. 1).

It is worth noting that by 2015 there is a significant reduction in the share of Moldovan students with performances below level 2 (with 5.3 pp in Science, 11.4 pp in Reading and with 10.4 pp in Mathematics) (Fig. 1).

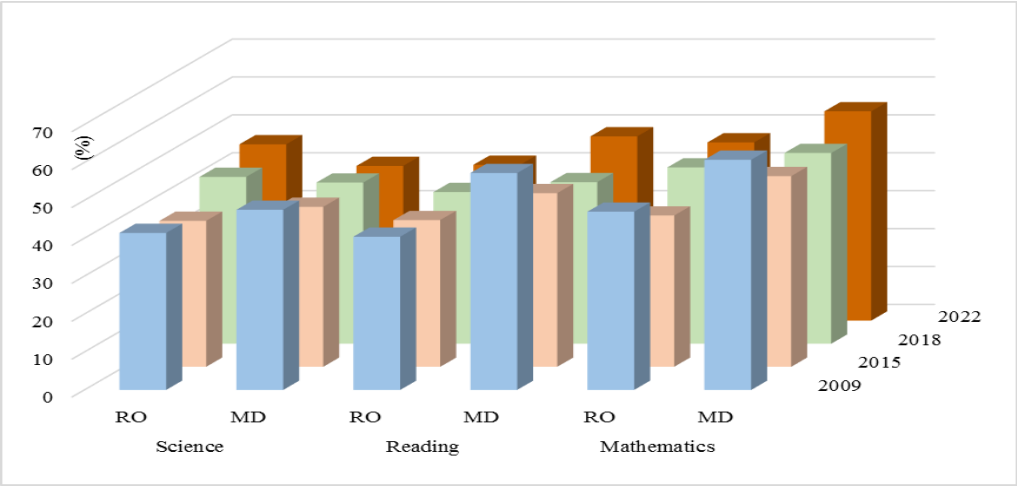

Fig. 1. The evolution of the percentage distribution of students who performed below level 2, in PISA 2009-2022 assessments, in Romania and the Republic of Moldova

Source: Authors' elaboration after OECD's Programme for International Student Assessment (PISA), 2002-2022

For the same period, the share of students with outstanding performance, i.e. Performing at levels 5 and 6 (students who prove an increased ability to solve problems of which solutions often require the incorporation of mathematical knowledge that are not explicitly mentioned in the work task or are able to think critically and to correctly use symbolic and formal mathematical operations and relationships to communicate their reasoning clearly) increased by 0.3 pp in Science, 1.3 pp in Reading and by 2 pp in Mathematics for the students in Romania and by 0.5 pp in Science, 1.1 pp in Reading and by 1 pp in Mathematics for the students in the Republic of Moldova (Fig. 2).

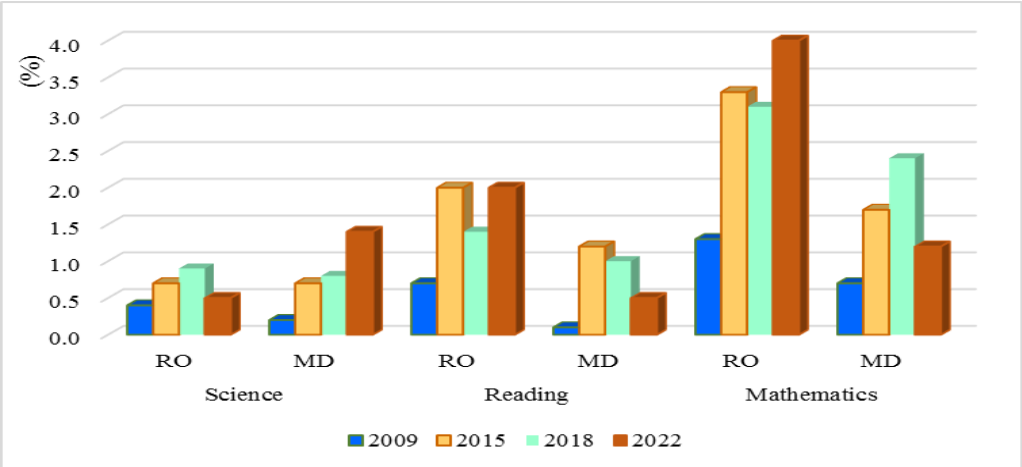

Fig. 2. The evolution of the percentage distribution of students who performed at levels 5 and 6, in PISA 2009-2022 assessments, in Romania and the Republic of Moldova

Source: Authors' elaboration after OECD's Programme for International Student Assessment (PISA), 2002-2022

Analysis of the results obtained by the students in Romania and the Republic of Moldova performing at level 2 (students who can use basic or everyday scientific knowledge to identify a valid conclusion from a set of simple data and they demonstrate basic epistemic knowledge in that they are able to identify questions that can be investigated scientifically) indicate an increase in the share of this segment of students only in Science, and a reduction in Reading and Mathematics for Romanians, while for the students in the Republic of Moldova the results are inversed (increase in Reading and Mathematics and decrease in Science (Fig. 3).

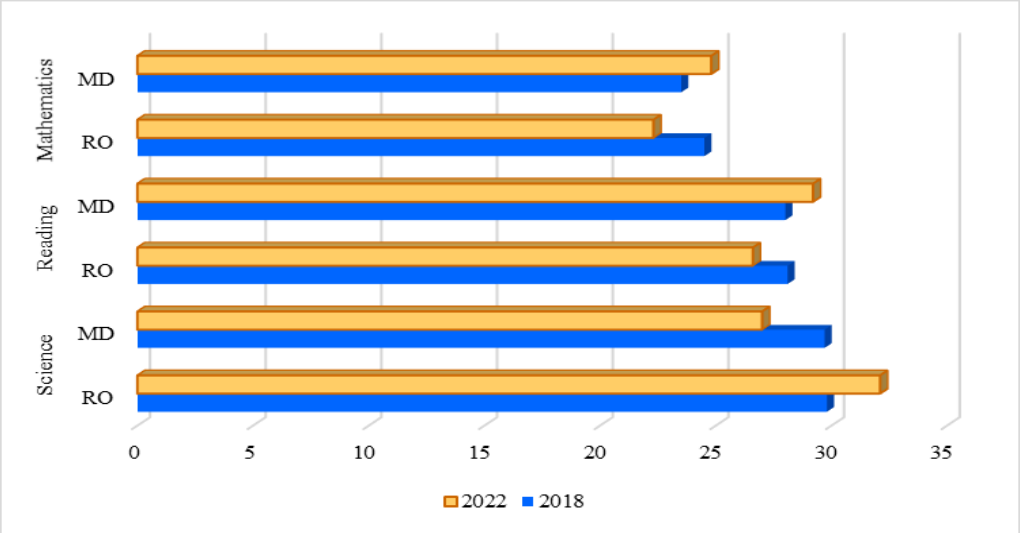

Fig. 3. Changes in the share of students who performed at level 2, at PISA 2018-2022 evaluations, in Romania and the Republic of Moldova, (%)

Source: Authors' elaboration after OECD's Programme for International Student Assessment (PISA), 2002-2022

These changes may also be due to the COVID-19 pandemic, which has had negative consequences for both children's educational progress and their emotional health and, moreover, their online safety and have the same trends as the OECD average.

Throughout the consecutive PISA assessments until 2018, no change in the OECD average has ever exceeded four points in Mathematics and five points in Reading: However, in PISA 2022, the OECD average dropped by almost 15 points in Mathematics and by about 10 points in Reading compared to PISA 2018. Nevertheless, the average performance in Science remains stable. Unprecedented declines in Mathematics and Reading indicate the shocking effect of the COVID-19 pandemic on most countries.

However, the decline can only be partially attributed to the COVID-19 pandemic, with negative trends in the Mathematics performance already being

apparent before 2018 in some countries such as Belgium, the Czech Republic, Finland, France, Hungary, Iceland, etc.

The period during which schools were closed varied among countries (for example, from limited closing of schools in Iceland, Sweden and Chinese Taipei, to systems that experienced longer periods in which schools were closed, such as Brazil, Ireland and Jamaica).

The closing of schools during the pandemic has led to a global conversion to digitally-enabled distance learning. If we take into account the long-term challenges that have already arisen, such as the use of technology in classrooms, then a defining feature of effective educational systems will be the way in which they, together with decision-makers, find the right balance between risks and opportunities.

In the PISA test of 2022, on average, in OECD countries, boys outperformed girls in the field of Mathematics by nine points, and girls outperformed boys in Reading by 24 points: "the difference between boys and girls does not concern the level of their performance in the scientific fields, but their attitude toward science" (Report of the National Center: Testing Cycle 2014-2015, 2017). In Science, the difference in performance between boys and girls was not significant.

Characteristic for Romania and the Republic of Moldova is that girls scored slightly higher than boys in Science and Reading and a lower score in Mathematics (Fig. 4).

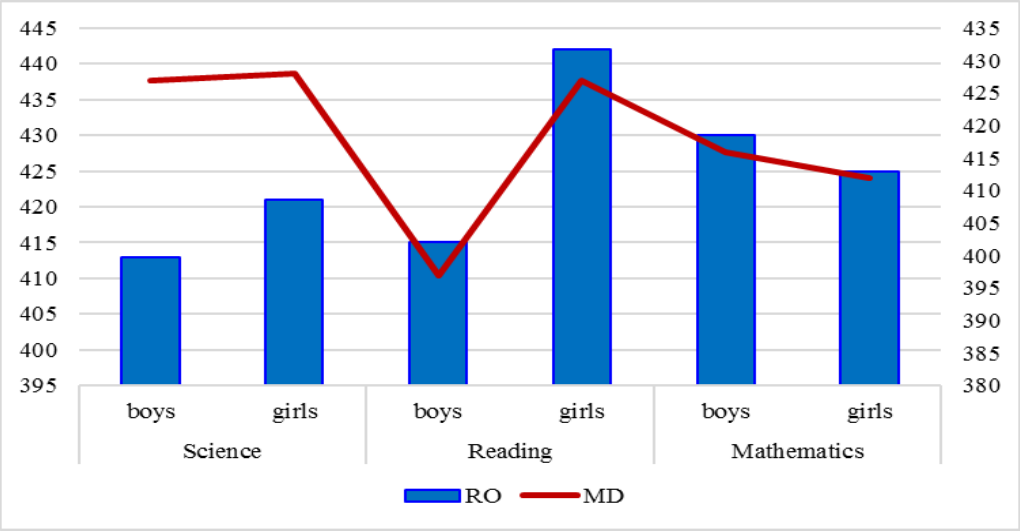

Fig. 4. Performance in Mathematics, Reading and Science, by gender in PISA 2022 assessments, (average score)

Source: Authors' elaboration after OECD's Programme for International Student Assessment (PISA), 2002-2022

The equity of educational systems with regard to students from different socio-economic backgrounds can be examined using different characteristics of the statistical relationship between student performance at PISA assessments and their socio-economic status. The socio-economic status index allows the identification of advantaged and disadvantaged students, as well as advantaged and disadvantaged educational institutions in each country.

According to the data in Fig. 5, it results that, both in Romania and in the Republic of Moldova, socio-economically disadvantaged students perform worse in all fields than advantaged students (Fig. 5).

In Romania, the difference (in the manner) between the average scores of these categories of students is over 100 points (in the field of Mathematics 132 points; in the field of Reading 124 points; in the field of Science 123 points). About 7% of disadvantaged students in Romania, despite their socio-economic disadvantage, still manage to reach higher levels of competence in Mathematics, as compared to other students in their own country.

In the Republic of Moldova, the difference between the average scores is over 80 points (in the field of Mathematics 82 points; in the field of Reading 92 points; in the field of Science 81 points). Significant differences were registered at the level of the European Union, for the EU average the biggest difference was in the field of Science (99 points) and the smallest difference in the field of Reading (96 points).

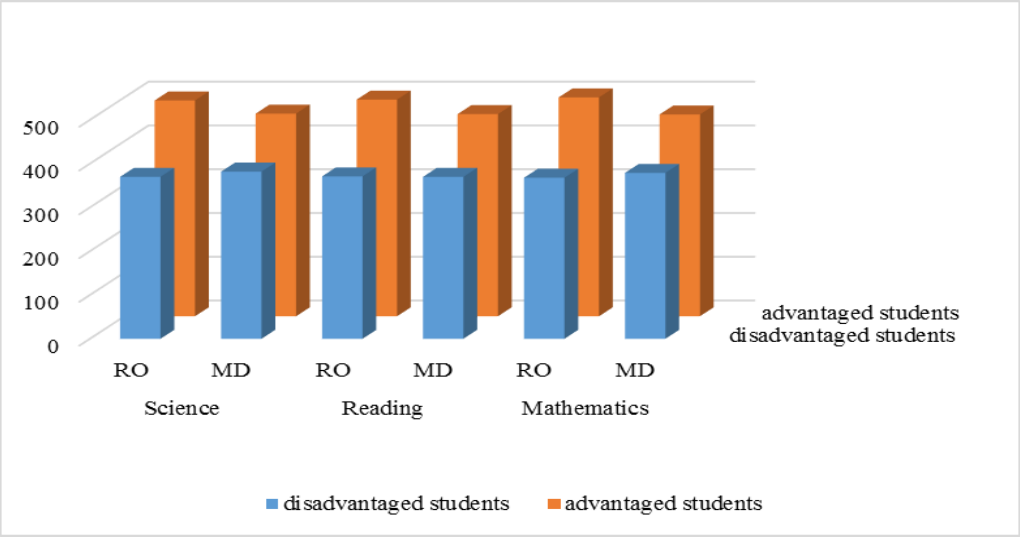

Fig. 5. Performance at PISA 2022 assessment among the disadvantaged and socially-economically advantaged students (average score)

Source: Authors' elaboration after OECD's Programme for International Student Assessment (PISA), 2002-2022

Functional illiteracy in Romania and in the Republic of Moldova is also sustained by the decrease in participation in pre-school education, by groups at risk of early school abandonment, with a focus on children belonging to the Roma minority and those from rural areas, by the increase in school dropout, by the poor participation of adults in lifelong learning, by the high share of rural unemployed people who are almost illiterate, etc.

4. Conclusion

PISA tests are internationally standardized and represent a global effort to assess and compare student performance in key areas of education. Initiated by the Organisation for Economic Cooperation and Development (OECD) in 1997, this program has become over the years a tool which is both effective and equally important to understand and assess the global education system.

According to OECD data regarding PISA 2022 assessments, the percentage of 15-year-olds in the compulsory education in Romania and in the Republic of Moldova, who cannot select the relevant information and cannot make basic reasoning, and must therefore be considered functionally illiterate, is 42% and 44.3%, respectively.

The average scores obtained by Romanian students in 2022 were similar to those recorded in 2018 in all fields, but in Mathematics they are lower than in PISA 2012 and 2015 assessments. The results in Reading and Science were similar to those obtained in the previous PISA assessments, starting with 2012. Although there has been no significant improvement of Romanian students in the PISA 2022 assessment, however, this relative stability can be considered positive in the context of the expansion of compulsory education and of the improvement of access to education of marginalized groups which has increased the number of 15-year-olds eligible for the PISA assessment.

The results obtained by students from the Republic of Moldova indicate that this country reduced the difference from other European countries in Mathematics, Reading, but in Science the trend is still negative.

The PISA 2022 test also shows that girls, both from Romania and from the Republic of Moldova, achieved better results than boys in Reading and Science. Students in urban areas performed better than those in rural areas, and students socio-economically advantaged registered a higher performance in all fields than disadvantaged students.

The COVID-19 pandemic, the cessation of educational institutions' activity and the transition to online or hybrid learning have had a negative impact on

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academic performance. In the PISA 2022 test, the average scores in most participating countries decreased as compared to those in previous test cycles.

A poor (or missing) qualification of young people and adults does not give them the opportunity to access better paid jobs and therefore, even with economic growth, poverty levels do not decrease. The roots of this problem are obviously in the education system.

In order to mitigate the effects of functional illiteracy, several strategies should be considered, that should address both disadvantaged groups (socially and economically vulnerable families) as well as teachers.

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