Article

Not peer-reviewed version

Distance Learning Exit Economic Model

Vaidas Gaidelys *, Rūta Čiutienė *, Gintautas Cibulskas

Posted Date: 25 August 2023

doi: 10.20944/preprints202308.1767.v1

Keywords: distance learning; distance learning exit model; distance learning financing; COVID-19 pandemic

Article

Distance Learning Exit Economic Model

Vaidas Gaidelys [1], Rūta Čiutienė [2] and Gintautas Cibulskas [2,*]

[1] School of Economics and Business, Kaunas University of Technology, 44249 Kaunas, Vaidas.Gaidelys@ktu.lt (V.G.)
[2] School of Economics and Business, Kaunas University of Technology, 44249 Kaunas, Lithuania; ruta.ciutiene@ktu.lt (R.**Č.**)
[3] Faculty of Social Sciences, Arts and Humanities, Kaunas University of Technology,44249 Kaunas, Lithuania; gintautas.cibulskas@ktu.lt (G.C.)
* Correspondence: School of Economics and Business, Kaunas University of Technology, 44249 Kaunas, Vaidas.Gaidelys@ktu.lt (V.G.).

Abstract: At the beginning of 2020, with the onset of the pandemic, the traditional learning environment for learners drastically changed globally. Since then, most students/teachers have started and practiced distance and virtual learning/teaching. Thus, a technological breakthrough in virtual learning has followed. In connection with this, many countries worldwide have commenced allocating additional financing and funds for educational institutions' technological improvement and development. The long-term stay in distance learning has revealed and highlighted new problems students face: their knowledge level has decreased, they lack socialization skills, and they face psychological and physical health problems. Due to this negative impact on students, a need to research and evaluate how much the EU countries allocated to solve the distance learning-caused problems and what programs or models they prepared has emerged and encouraged further studies. The research has found that many countries increased their allocations very minimally, e.g., 0.0.1%, but some increased their available budgets to 32%. Notably, most countries did not separate distance learning exit funding from distance learning preparation funding. Based on the problems the countries saw, only a few states identified withdrawal from distance learning as a problem. Considering this, we set ourselves the goal to evaluate exit models from distance learning and allocated funding amounts. The following objectives were planned to achieve the goal: to evaluate the global practice of exit from distance learning; to determine the scope of funding for pandemic management; to evaluate the amounts of funding allocated to manage pandemic-caused consequences and the GDP ratio. Research methods: mathematical-statistical analysis, empirical analysis, and analysis of scientific literature.

Keywords: distance learning; distance learning exit model; distance learning financing; COVID-19 pandemic

1. Introduction

The introduction should briefly place the study in a broad context and highlight why it is important. It should define the purpose of the work and its significance. The current state of the research field should be carefully reviewed and key publications cited. Please highlight controversial and diverging hypotheses when necessary. Finally, briefly mention the main aim of the work and highlight the principal conclusions. As far as possible, please keep the introduction comprehensible to scientists outside your particular field of research. References should be numbered in order of appearance and indicated by a numeral or numerals in square brackets—e.g., [1] or [2,3], or [4–6]. See the end of the document for further details on references.

2. Materials and Methods

During the study, the impact of distance learning on students, teachers, and parents was evaluated using a questionnaire survey in various aspects such as students' knowledge level, intelligence, socialization skills, mental and physical health, and intelligence. In order to more accurately evaluate the impact on students' knowledge, the student learning achievements, the

 doi:10.20944/preprints202308.1767.v1

dynamics of referrals to psychologists, and the dynamics of reported health problems were also assessed. We used the Wechsler short-scale personalized data of 2017, 2018, 2019, 2021, and 2022 obtained from the conducted research to evaluate the impact on student intelligence.

The literature analysis and multi-level/stage focus groups with experts and representatives of government authorities and management institutions were used for creating the model.

We used reliable statistical data to evaluate the financing volume and performed calculations comparing the financing volume with the GDP of the countries.

Also, we evaluated the need for funding to implement the developed model of exit from distance learning by considering the amount of time devoted to solving problems and assessing the cost of the time dedicated to the example of Lithuania.

3. Results

The experts and members of the European Commission's European Expert Network on Economics of Education (EENEE), K. De Witte and M. Smet, analyzed the additional economic aspects that emerged and were caused by the pandemic. Also, they presented the amounts of allocated additional funding differentiated by student age respectively (see Table 1), where, e.g., in Belgium, the regions of Flander and Wallonia, in 2021-2022, the total additional costs amounted to 353 million euros (Witte and Smet, 2021):

Table 1. Costs by country.

Country	Explanation of Additional Costs (allocated for)	Total Amount of Costs (in million/billion euros)	Amount per Student (in euros)
Belgium (Flander and Wallonia regions, in 2021-2022) [1, Vermeersch, (2020); 3, 4, 5]	primary education up to 4th year	15 M	25
	primary education of 5th and 6th year	45 M	290
	secondary education	232 M	510
	dual learning methods and special needs	10 M	510
	recruitment of additional teachers	147 M	
	strengthening student counseling centers	36 M	
	summer schools	21.8 M	
	mitigating the impact of the pandemic on secondary education institutions	19 M	
Estonia (only private schools provided additional funding) [6]	private education institutions, based on their interest profile	15 M	
	youth education	1.5 M	
	private secondary education institutions	4.3 M	amount ranged from 10 to 50, depending on the severity of the COVID-19 pandemic restrictions
	minimizing the spread of coronavirus	6 M	40
	summer camps	6 M	
Finland [7–9]	preschool and secondary education	70 M	

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 25 August 2023 doi:10.20944/preprints202308.1767.v1

	support of learning, development, and well-being	14 M	
	compensate for the impact of the coronavirus crisis	17 M	
	one-time funding for education equality to help municipalities reduce the education gap between richer and poorer social areas	67.8 M	
Greece [10–12]	supply of laptops and tablets to schools in 2020	12.1 M	
	supply of tablets to families with an income of up to € 6,000	112 M	200
Italy [13,14]	adaptation of education institution premises while recruiting new/additional teaching staff	1 B	
	learning adaptation for disabled children	331 M	
	"Digital Innovation and Training Workshop Fund" (Italian Healing Decree)	85 M	
	implementation of the measures for the "COVID-19 Epidemiological Emergency Foundation"	400 M (in 2020) + 600 M (in 2021)	
	summer "bridge" programs	510 M	
Lithuania [15–17]	providing schools with laptops and tablets through the European Social Funds (ESF) in 2021	6 M	
	providing individual counseling to students who have learning difficulties due to distance learning	1.348 M	
	volunteers from non-governmental organizations to provide teaching/learning support or supervision in the education field institutions	250 000	
	creation of thematic videos and provision of open consultations for the graduates, teachers of the graduate students, and/or teachers who prepared students for maturity examinations	160 000	
	supporting the learning-oriented children's summer camp programs through various non-formal education activities	300 000	
	counseling students with learning difficulties	650 000	
Malta [18]	mitigating the impact of the pandemic on children	30 M	
Netherlands [19–21]	primary, secondary, and special education	5.8 B	

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 25 August 2023 doi:10.20944/preprints202308.1767.v1

	secondary vocational and higher education	2.7 B
	additional/supplemental benefits for students	645 M
Portugal [22–27]	artistic education to mitigate the impact of the COVID-19 pandemic	10 M
	acquisition of 250 000 laptops, 4G electronic devices, headphones and backpacks	62.5 M
	procurement of 15 000 additional computers in 2021	4.5 M
	digitalization of school - funded by the program "Economic and Social Stabilization"(PEES)	400 M
	providing schools with digital learning materials - funded by the "Recovery and Resilience Plan" (RRP)	500 M
Romania [28–30]	procurement of internet-connected tablets for students	30.5 M
Slovakia [31,32]	tutoring in the first project, "Together," to help students from families with social needs	500 000
	the later phase of “Together Wiser” that covered all eligible schools	1 M

Based on the statistical information given in Table 1, we can see that the Netherlands allocated the most significant funds to control the consequences of the Covid-19 pandemic, i.e., 9.145 billion euros. Lithuania was in second place, having allocated - 1,355.66 billion euros or 3,577.7 euros per student/teacher, which, applying a conversion into hours, equals 357.77 hours with an additional 8 hours per week for a student. It allows concluding that the entire program for eliminating the consequences of the COVID-19 pandemic would take more than 11 months.

Other authors classify cost information into the following categories:

- General financing (GEN);
- Financing for purchasing IT equipment (ICT);
- Investment in infrastructure (INF);
- Prevention and protective measures (PRE);
- Recruitment of additional teachers, bonus remuneration for teachers (TEA);
- Summer programs (SUM);

Student counseling and support (COU).

Table 2 shows that the most common category of costs is ICT, which means that funds are allocated for acquiring portable laptops, tablets, better high-speed internet access, and other IT equipment and overall improved ICT infrastructure at schools. Another common category is "Recruitment of additional teachers" or "Additional teacher training" (TEA in the table above).

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 25 August 2023 doi:10.20944/preprints202308.1767.v1

Table 2. Additional funding by cost category.

Country	Category of Costs						
	GEN	ICT	INF	PRE	TEA	SUM	COU
Belgium (Flanders)			X		X	X	X
Belgium (Wallonia)	X	X		X	X		X
Estonia	X						
Finland	X	X					
Greece		X					
Italy		X	X	X	X	X	
Lithuania		X					X
Malta	X						
Netherlands	X				X	X	
Portugal	X	X			X		
Romania		X					
Slovakia	X						

On the other hand, some study authors noted that although, in theory, an ICT-based education had great potential, advantages, and opportunities for differentiation, learning methods, and feedback; however, a long-time application of distance learning caused various problems resulting in undermined learning outcomes (Iterbeke et al., 2020).

Table 3. Growth of additional costs per student.

Country	Growth of additional costs per student percentage
Belgium (Flanders)	4.82%
Belgium (Wallonia)	0.43%
Estonia	4.77%
Finland	1.59%
Greece	2.16%
Italy	3.96%
Lithuania	0.68%
Malta	9.15%
Netherlands	32.22%
Portugal	13.55%
Romania	0.80%
Slovakia	0.05%
AVERAGE	**3.06%**

Notably, the evaluation and measurements of students' knowledge levels done after the first wave of the Covid-19 pandemic did not show such a significant decline. However, the subsequent measurements of the student's knowledge level indicated a more substantial reduction in the knowledge level. Due to this fact, according to other authors, from September 2020, human capital formation was linked to income (Chetty, 2014), employment (Currie and Thomas, 2001), and general well-being (Hanushek and Woessmann, 2020). According to Kaffenberger, theoretical models show that a decrease in student knowledge level was observed later over time (Kaffenberger, 2020).

The experts of the European Commission, K. De Witte and M. Smet, stated that the funding allocated to eliminate the damage caused by distance learning to students was insufficient (Witte and Smet, 2021).

In addition, it is also shall be noted that when assigning additional funds to students to eliminate and fight the damage caused by distance learning, financial allocations in most European countries were very limited:

 doi:10.20944/preprints202308.1767.v1

According to the allocated funds as a percentage of GDP to solve the problem, Lithuania stands out, having allocated more than twice of funds (1.93%) compared to others, but this, however, was not sufficient to overcome the challenges. Slovakia allocated the least funds (0.002 %) (World Bank, 2002) (Table 4).

Table 4. Funds allocated to fight the pandemic in the field of education as a percentage of GDP.

No.	Country	GDP in 2022, in billions of US dollars	Allocated funds, as a percentage of GDP
1.	Belgium	579	0,09
2.	Estonia	38	0,09
3.	Finland	281	0,06
4.	Greece	219	0,06
5.	Italy	2 000	0,09
6.	Lithuania	70	1,93
7.	Malta	18	0,17
8.	Netherlands	991	0,92
9.	Portugal	252	0,39
10.	Romania	301	0,01
11.	Slovakia	115	0,002

The evaluation of the emerging challenges caused by the Covid-19 pandemic cleared a need for creating a model for the distance learning (re)organization that could help eliminate the negative impact of the coronavirus on the student's education, physical and mental health, and socialization (Table 5).

Table 5. Distance learning exit model.

Action	Aim	Method	Time used for evaluation	Remedial measures	Time used for the implementation of measures	Costs in euros per hour
Student IQ Evaluation	To define student IQ changes	Wechsler Short IQ Scale or similar method	60 min per person	Wechsler Short IQ Scale, testing of all students	60 min per person	45
Evaluation of students' learning achievements and progress situation	To define student learning results and learning load changes	Analysis of student learning achievements at school Research instrument is a research questionnaire	3 hours	Prepared plan of measures provides for the following: - measures for improving the quality of teaching and learning (applied educational methods, assessment,	80 hours	10

 doi:10.20944/preprints202308.1767.v1

		(appendix No. 1)		attendance, etc.) - student assistance/support measures (consultations, support plans, cooperation with parents, etc.) - means of regulating students' workload (assignments for assessment, homework, the competence of students' learning ability, etc.)		
Identifying gaps in students' knowledge	To identify gaps in the knowledge of students that were caused by distance learning	Analysis of students' learning achievements at school Subject knowledge verification tests	8 hours	Based on the results, preparing/adjusting individual learning programs according to subjects, providing individual support/gap measures for students	80 hours per subject	10
Evaluation of the available IT infrastructure and provision	To determine the current state of the available IT infrastructure and provision of teachers and students with IT equipment and tools	Research instrument is a research questionnaire (appendix No. 1)	90 min	Acquisition/rental of required infrastructure tools/measures	-	15
Evaluation of digital learning environment and content	To determine the presentation and adequacy of digital learning	Research instrument is a research questionnaire	90 min	- Acquisition/rental of the necessary digital learning environments	-	15

 doi:10.20944/preprints202308.1767.v1

	environments and content used	(appendix No. 1)		- Training of students and teachers in the use of digital environments - Joint agreements on the purposeful use of environments, methods, and means of content presentation		
Evaluation of teacher and student digital competency gaps	To identify teacher and student digital competency gaps	Research instrument is a research questionnaire (appendix No. 1) SELFIE tool recommended	90 min	- Organization of necessary training - Incorporating elements of digital competence development into subject curricula	24 hours	10
Identification of gaps in the teaching, learning, and assessment processes in distance learning	To identify gaps in the distance education, learning, and assessment process	Research instrument is a research questionnaire (appendix No. 1)	90 min	Based on the results of the survey, the following measures are planned: - elimination of gaps in students' learning (measures to compensate for subject knowledge and learning losses) - changes in the existing procedure for assessing students' achievements and learning progress	180 hours	10
Evaluation of assistance/support measures	To identify existing assistance/sup	Research instrument is a	90 min	Provision of individual assistance/supp	90 hours	10

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 25 August 2023 doi:10.20944/preprints202308.1767.v1

for teachers and students	port measures for students and teachers	research questionnaire (appendix No. 1)		ort measures for teachers and students, summer camps, etc.		
Determining student engagement in the distance learning process	To evaluate students' motivation and level of cooperation during distance learning	Research instrument is a research questionnaire (appendix No. 1)	90 min	Based on the results of the study, to adjust/create the student motivational system, including the elements of distance learning that increase student motivation and cooperation (e.g., uploading and storing lesson material in digital environments, providing the possibility of consulting with teachers in a distance learning environment, organizing hybrid/mixed education, etc.)	80 hours	10
Evaluation of students' physical state	To evaluate changes in students' physical activity during distance learning	Research instrument is a research questionnaire (appendix No. 1) Tests for the evaluation of student physical capacity	90 min	Based on the study and physical capacity evaluation results: - to assign more tasks during physical education lessons that strengthen the weakest components of physical capacity (HR, muscle	90 hours	10

 doi:10.20944/preprints202308.1767.v1

				strength, endurance, flexibility, balance, etc.) - to cooperate with students' parents in providing recommendations on measures to improve children's physical activity - to organize physical activities during lessons and breaks; - to purchase ergonomic school furniture (e.g., adjustable height desks)		
Evaluation of students' social-psychological state	To evaluate the need for students' social-psychological assistance	Research instrument is a research questionnaire (appendix No. 1) Performing secondary data analysis	90 min	- Psychologist and social worker-teacher consultations - Child Welfare Commission's (VGK) student support plans. - Student involvement in activities for the development of social skills (preventive programs, social projects, social skills, educational groups, non-formal education activities, etc.)	48 hours per student	10

Moreover, it should be noted that when comparing the increase in funding with the previous one in 2017, the highest growth was observed in the Netherlands, while Lithuania being in second place, dropped sharply towards the end of the list (Table 3):

 doi:10.20944/preprints202308.1767.v1

Taking international practice and research into account, we created a distance learning exit model to eliminate the damage caused by distance learning to students' knowledge, mental and physical health, as well as students IQ. In the case of Lithuania, we also evaluated the need for funding to implement this model.

Notably, the increase in financing after the pandemic period in Lithuania was minimal, and compared to the previous period, it went up by only 0.68 %. Based on the evaluation of the common need for funds results by applying the model created as the example of Lithuania, the funding per student amounts to 6,795 euros when calculating the teacher's salary at 10 euros per hour. According to the 2023 data in Lithuania, there were 344,420 students in 2022-2023.

Therefore, considering this fact and in order to apply the created exit model to eliminate the pandemic-caused adverse consequences in education, a total of 2,340,333,900 euros would be needed for the entire number of students.

4. Discussion

Many countries researched in this study did not divide the problems caused by the coronavirus into stages and therefore allocated the funds to general financing (GEN). The funding was often directed to facilitating access to distance learning, i.e., purchasing IT equipment for distance learning, creating programs, etc. Notably, this was also distinguished by the majority of analyzed authors and the structure of funds allocated to the education sector they surveyed. We though studied the problem in more detail. As a result, with the detailed analysis of both positive and negative consequences of distance learning, we could distinguish the damage caused by distance education to students' physical and mental health, socialization, and knowledge. Based on the conducted research, we created a distance learning exit model and provided an algorithm for its application. Also, we assessed the financial need for the model application.

The conducted studies showed that in order to apply the created model fully, 6,795 euros should be intended for each student. The required budget can be estimated depending on the number of students in the country. It should be noted that depending on each country's curriculum, the model can be adjusted, and the hourly salary of teachers must also be taken into account. The financing of the model was evaluated based on the actual circumstances in Lithuania, and respectively, an hourly pay of 10 euros for teachers was intended.

5. Conclusions

- In response to the crisis caused by the pandemic, many EU member countries increased the education budget to finance short-term and long-term damage to students' knowledge. Additional set funding ranged from 2 euros per student in Slovakia to 2,795 euros per student in the Netherlands. The median was 163 euros. Relating these amounts to current expenditure, we see that this corresponds to an increase in public spending on education of 0.05% in Slovakia and 32% in the Netherlands. The average increase was around 3% (Witte and Smet, 2021).
- Notably, many countries understood that the right way to deal with the COVID-19 pandemic challenges in education was to provide students and teachers with IT equipment, devices, and tools which used the primary funding.
- After evaluating the common need for funds results by applying the model created as the example of Lithuania, the funding per student amounted to 6,795 euros when calculating the teacher's pay of 10 euros per hour. Taking into account the fact that according to the data of 2023, there were 344,420 students in Lithuania in 2022-2023, therefore, in order to apply the created model of exit from the pandemic, 2,340,333,900 euros would be needed for the entire number of students.
- According to the allocated funds from the GDP to solve this problem, Lithuania stood out, having allocated two times more funds (1.93%) than others, but it was insufficient to solve the challenges. Slovakia allocated the least amount of funds (0.002%).
- In order to implement a sophisticated distance learning exit model, the funds allocated to the education sector are insufficient.

- The conducted studies showed that to apply the created model fully, the amount of 6,795 euros per student should be intended. The required budget can be estimated according to the number of students in each country. It should be noted that depending on each country, the curriculum model can be adjusted, and the hourly pay of teachers shall also be taken into account. The financing of the model was evaluated and estimated based on the actual circumstances in Lithuania, with a provided hourly pay of 10 euros for teachers.

Author Contributions: Conceptualization, V.G., R.Č., G.C., and S.M.; methodology, V.G., R.Č., G.C., and S.M.; formal analysis, V.G., R.Č., G.C., S.M., and E.G.; investigation, V.G., R.Č., G.C., S.M., and E.G.; resources, V.G. and E.G.; data curation, V.G., R.Č., and G.C.; writing—original draft preparation, V.G., R.Č., G.C., and S.M.; writing—review and editing, V.G., R.Č., G.C., S.M., and E.G.; visualization, supervision, V.G.; project administration, R.Č.; funding acquisition, E.G. All authors have read and agreed to the published version of the manuscript.

Funding: This project has received funding from European Regional Development Fund 13.1.1-LMT-K-718-05-0013 under grant agreement with the Research Council of Lithuania (LMTLT). Funded as European Union's measure in response to Cov-19 pandemic.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Website niet bereikbaar vanuit deze locatie (vlaanderen.be)
2. Vermeersch, B. (2021). Honderden extra leerkrachten om leerachterstand bij leerlingen weg te werken. Honderden extra leerkrachten om leerachterstand bij leerlingen weg te werken | VRT NWS: nieuws
3. Honderden extra leerkrachten om leerachterstand bij leerlingen weg te werken | VRT NWS: nieuws
4. Rekenhof (2021). Impact van COVID-19 op de Vlaamse begroting. Verslag van het Rekenhof aan het Vlaams Parlement Goedgekeurd in de Nederlandse kamer van het Rekenhof.
5. Enseignement.be - Circulaires.
6. Avaleht | (kriis.ee)
7. Tila - OKM - Opetus- ja kulttuuriministeriö
8. Valtion erityisavustus lukiokoulutukseen koronaviruksen aiheuttamien poikkeusolojen vaikutusten tasoittamiseksi | Opetushallitus (oph.fi)
9. Finland earmarks €68m for educational inequality exposed during pandemic | News | Yle Uutiset
10. ΥΠΟΥΡΓΕΙΟ ΠΑΙΔΕΙΑΣ & ΘΡΗΣΚΕΥΜΑΤΩΝ - ΑΡΧΙΚΗ (minedu.gov.gr)
11. Ψηφιακή Μέριμνα ΙΙ - Κοινωνία της Πληροφορίας Μ.Α.Ε. - Κ.Τ.Π. Μ.Α.Ε. (ktpae.gr)
12. Greece:- Voucher 200 euros for tablets, laptops: The process begins - The beneficiaries - Zakynthos Informer
13. The measures introduced by the Italian government to support families - Ministry of Economy and Finance (mef.gov.it)
14. Piano Estate: lingue, musica, sport, digitale, arte, laboratori per le competenze. Via libera a un pacchetto da 510 milioni per le attività rivolte a studentesse e studenti. Il Ministro Patrizio Bianchi: “Stiamo costruendo un ponte per il nuovo inizio” - Piano Estate: lingue, musica, sport, digitale, arte, laboratori per le competenze. Via libera a un pacchetto da 510 milioni per le attività rivolte a studentesse e studenti. Il Ministro Patrizio Bianchi: “Stiamo costruendo un ponte per il nuovo inizio” - Miur
15. Puslapis nerastas | Mano vyriausybė (lrv.lt)
16. Mokinių konsultacijoms – papildomi pinigai iš Vyriausybės rezervo | Mano vyriausybė (lrv.lt)
17. Korepetitoriai Vilniuje ir Kaune | PagalbaMokytis.lt
18. COVID – a learning curve - The Malta Independent
19. 8,5 Miljard euro voor Nationaal Programma Onderwijs | Nieuwsbericht | Rijksoverheid.nl
20. Nationaal Programma Onderwijs steunprogramma voor herstel en perspectief | Kamerstuk | Rijksoverheid.nl

21. Q&A Plannen kabinet collegegeld bekostigd hoger onderwijs | Publicatie | Rijksoverheid.nl
22. Covid-19: Governo aumenta financiamento do ensino artístico em cerca de 10 ME (lusa.pt)
23. Ministério da Educação garante que computadores começam a ser distribuídos no segundo período | Coronavírus | PÚBLICO (publico.pt)
24. Governo paga 62,5 milhões por mais de 250 mil portáteis para alunos. Saiba quem os está a fornecer – ECO (sapo.pt)
25. Ministério da Educação compra 15 mil computadores adicionais - Educação - Jornal de Negócios (jornaldenegocios.pt)
26. Ministério da Educação compra 15 mil computadores adicionais - Educação - Jornal de Negócios (jornaldenegocios.pt)
27. Ministério da Educação prevê início de entrega de computadores aos alunos carenciados até março - Expresso
28. Guvernul alocă 150 de milioane de lei pentru tablete destinate elevilor din mediile defavorizate (europalibera.org)
29. Costul standard per elev, pentru anul 2021, aprobat de Guvern. Nicio creștere pentru salarii, dar o majorare până la 36% în mediul rural pentru componenta cheltuielile cu pregătirea profesională, evaluarea periodică a elevilor, bunuri și servicii - Edupedu.ro
30. Guvernul României trebuie să dubleze cât mai repede fondurile investite în educație | UNICEF Romania
31. Rezort školstva na projekt doučovania vyčlenil v prvej fáze pol milióna eur | Ministerstvo školstva, vedy, výskumu a športu Slovenskej republiky (minedu.sk)
32. Na projekt „Spolu múdrejší“ sme vyčlenili ďalší milión | Ministerstvo školstva, vedy, výskumu a športu Slovenskej republiky (minedu.sk)
33. EUROSTAT, 2022.
34. The World Bank, 2022.
35. Chetty, R., Friedman, J. N., and Rockoff, J. E. (2014). Measuring the Impacts of Teachers II: Teacher Value-Added and Student Outcomes in Adulthood. American Economic Review, 104(9), 2633–2679. doi: 10.1257/aer.104.9.2633.
36. Hanushek, E. A., and Woessmann, L. (2020). The Economic Impacts of Learning Losses. OECD Education Working Papers, 225. Pp. 24.
37. Currie, J., and Thomas, D. (2001). Early Test Scores, School Quality and SES: Long-Run Effects on Wage and Employment Outcomes. Research in Labor Economics, 20, 103–132.
38. Kaffenberger, M. (2020). Modeling the Long-Run Learning Impact of the COVID-19 Learning Shock: Actions to (More Than) Mitigate Loss. RISE Insight Series, 2020/017. doi:doi.org/10.35489/BSG-RISE-RI{_}2020/017.
39. De Witte, K., Smet, M. (2021). Financing Education in the Context of COVID-19. European Expert Network on Economics of Education, European Commission.
40. Iterbeke, K. and De Witte, K. (2020). Helpful or Harmful? The Role of Personality Traits in Student Experiences of the COVID-19 Crisis and School Closure. Department of Economics, KU Leuven Discussion Paper Series 20.19, 30.
41. Iterbeke, K., De Witte, K., and Schelfhout, W. (2020). The Effects of Computer-Assisted Adaptive Instruction and Elaborated Feedback on Learning Outcomes. A Randomized Control 24 Trial. Computers in Human Behavior. In Press. (also, KU Leuven Discussion Paper Series DPS20.20).
42. Psacharopoulos, G., Collis, V., Patrinos, H. A., and Vegas, E. (2020). Lost Wages: The COVID-19 Cost of School Closures. Available at SSRN 3682160.
43. Azevedo, J. P., Hasan, A., Goldemberg, D., Iqbal, S. A., and Geven, K. (2020). Simulating the Potential Impacts of COVID-19 School Closures on Schooling and Learning Outcomes: A Set of Global Estimates (Policy Research Working Paper 9284). The World Bank.
44. Dorn, E., Hancock, B., Sarakatsannis, J., and Viruleg, E. (2020). COVID-19 and Student Learning in the United States: The Hurt Could Last a Lifetime (McKinsey and Company Public Sector Practice). McKinsey and Company.

 doi:10.20944/preprints202308.1767.v1

45. Jann, O., Münich, D. and Zapletalova, L. (2021). Výluka prezenční výuky během pandemie COVID-19: odhad neviditelných ekonomických ztrát. Institute for Democracy and Economic Analysis. CERGE. Pp. 28.
46. Blainey, K., Hiorns, C., and Hannay, T. (2020). The Impact of Lockdown on Children's Education: A Nationwide Analysis.