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Working Paper

Transition from Information and Communications Technology to Educational Technologies and Game-Based Learning in the Republic of Moldova: The Case of the Mobility Era Game

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Transition from Information and Communications Technology to Educational Technologies and Game-Based Learning in the Republic of Moldova: The Case of The Mobility Era Game

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Transition from Information and Communications Technology to Educational Technologies and Game-Based Learning in the Republic of Moldova. The Case of The Mobility Era Game¹

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³ Diaspora Engagement Hub (DEH) is a governmental programme of thematic grants implemented by the State Chancellery of Moldova through the Bureau of Diaspora Relations (BRD) within the project "Consolidation of the institutional framework of the Republic of Moldova in the field of migration and development". The Study in Romanian titled "*Transition from Information and Communications Technology (ICT) to Educational Technologies (EdTech) and Game-Based Learning in the Republic of Moldova. The opinion of Education Managers*", White Paper, November 2023 is available online.

Foreword

This Study mirrors the developments of information and communications technology (ICT) and its use in the education sector of the Republic of Moldova, where the term ‘education technologies’ (EdTech) is not widely used in education strategies and policies. Nonetheless, thanks to multiple nation-wide projects and important international technological partnerships, such as the first partnership of the Technical University of Moldova (TUM) with Google, there is an emerging interest of the national authorities, which is evidenced through enhanced endeavours aimed at education digitalization.

This Study pursues the goal to reveal the EdTech needs and relevance, as well as those of game-based learning through the lens of education institution managers from the Republic of Moldova (the sample comprises 70 respondents). The EdTech instrument proposed to education managers is the educational game “Mobility Era Game”.⁴ The Study comprises: a desk review of sources tackling the EdTech key trends in Europe and in the Republic of Moldova, the endeavours made by the Moldovan authorities to this end, the ICT-related educational policy framework, the collection of baseline data, using a Questionnaire, which was shared online by the Ministry of Education and Research with the District Education Directorates, as well as the processing of data and delivery the analysis outcomes.

Within this BRD-DEH Study, following the completion of the Questionnaire, all respondents were invited to attend four profile technical webinars, which are certified as part of continuous education. Thus, two online meetings were organized (four hours each), focused on game-based learning (using “Mobility Era Game” as a Case Study), and two more meetings were conducted to present the digital or computer-based assessments (using the “Test Designer” Case Study – an assessment programme developed in the Republic of Moldova). These webinars were validated and endorsed by the Dutch National Association “Dutch EdTech” (a scanned copy of Diploma sample is available in Annexes 6 and 7).

The Study preliminary outcomes show: (1) a high degree of adaptability and openness of Moldovan school leaders towards EdTech and a moderate use of educational games in the school curriculum; (2) a more enhanced information coverage in the urban area in terms of the latest technological developments in comparison with the rural area; and (3) a high degree of skepticism towards the use of EdTech games in the school curriculum due to various reasons.

The Study ends with conclusions and a series of recommendations.

⁴ The financial and civic education game application, namely “Mobility Era Game”, is used as an EdTech assessment tool. It is the winner of the “Triple E Awards” for the topic “Engaging an education instrument for society”, Europe Category (2023). The Game application and the table game have been developed by “Researchista” Company, which strives to employ the research outcomes via games and through other ways of society engagement into research.

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1. Introduction

The transition to computer-assisted learning on a global scale occurred relatively recently. Since the 1950s, there was a stronger growth of *information technology (IT)* in the USA leading to the development of a range of IT practices and devices. The widely used rear projector, followed by the development of desktop computers and laptops led to the use of such devices in the teaching process in order to contribute to a better understanding of technologies, and a new discipline named “Computer Science”/“Informatics” was introduced in the school curriculum. Hence, it is obvious that along with the advent of the internet in the Republic of Moldova (1995-1996), the education institutions started using computers for the Informatics classroom hours to learn programming and other IT and ICT-related matters (Figure 1, Annex 1). Hence, most Moldovan schools have got a computer-equipped classroom. Pursuant to the data provided by the National Bureau of Statistics, there are 66,913 PCs in the possession of legal persons from the Education Sector, which includes, *inter alia*, 1,218 primary and secondary schools (state and private). This explains the existence, nowadays, of multiple national programmes focused specifically on this area, including the digitalisation of education and the use of ICT infrastructure.

Another progress of great impact in adopting information technology was caused by the COVID-19 pandemic (World Development Report, 2022). The limitation of physical contact mandated by the public health policies, which struggled to prevent the spread of corona virus, conditioned the transition of all education entities across the world, including the Moldovan institutions, to online education. Hence, computer-assisted learning was not the feature of Computer Science only, but also of other disciplines. Namely, the accessibility of PCs and laptops fueled the mass transition from offline (classroom) learning to online or distance learning. Applications, such as Zoom, Microsoft Teams, Webex, etc., helped the teaching staff across the world to teach efficiently the subject material to their students.

The EdTech Concept emerged in the North America and has become a term taken up at the global level. *EdTech (or Education Technologies)* is an umbrella concept that defines a multitude of technologies used in the teaching and learning processes (McGrath C. and Akerfeldt A., 2018). These technologies include both hardware devices (for instance, interactive boards) and software, such as educational programmes or games. The infrastructure along with the educational theoretical basis (e-learning) made it possible for anyone to learn the desired subject, using a computer, without being limited to Computer Science, which is directly related to computers. Figure 2 (Annex 2) depicts some key differences between ICT and EdTech.

Despite the technological progress, the existence of EdTech equipment, the availability of ICT infrastructure and the endeavours aiming to digitalise the education sector, the “*Digital Education*

Readiness Assessment” conducted by the World Bank (2022) and used to show the extent to which an educational system is prepared for digitalisation, stated the score 2 (out of 4) for the Republic of Moldova.

The preparedness level for the integration of IT in education is high in the Republic of Moldova⁵, but requires further support. This Study focuses on EdTech and their development in the Republic of Moldova and aims to support the Ministry of Education and Research’s endeavours in this area. To facilitate such transition for the teachers across the world (Figure 6 depicts the USA Strategy to this end), let us review the outcomes of the European and national trends analysis in the area of education conducted by Trofimov and Pintilei (2020). The Authors stated that the key role belongs to the educational management – at all decision-making levels – to plan, organise and monitor the reforms and transition to better and more advanced education systems that are tailored to the needs of modern society. Therefore, we aim to identify the position of Moldovan education managers vis-a-vis the transition from ICT to EdTech, their openness towards the use of EdTech and the barriers they encounter to this end. In view of the EdTech peculiarity and how recently it gained momentum throughout the world (prevailing, as of 2020, when the COVID-19 pandemic hit the world, and online education became a necessity)⁶, it is important, first of all, to understand the view of educational management in order to determine the degree of their interest and openness towards adopting a new infrastructure. Against the background of the most recent trends and endeavours in the field of education, the necessity of such a Study has got an increased relevance.

1.1 Study Goals and Objectives

The Study has been developed as a supporting material for the Moldovan Ministry of Education and Research (MoER), within the BRD-DEH “*Education Technologies and Game-based Learning*” Project. The Study includes a survey conducted during September – October 2023. The Study focuses on the analysis of EdTech and game-based learning in the school environment in the Republic of Moldova, building on the survey outcomes conducted amongst the school managers. The Study goal is to support both the MoER and the school management in the process of integrating EdTech in schools. Therefore, the youth from the Republic of Moldova would be more motivated to easier learn a wider amount of information and to step into their adulthood, being better prepared.

The Study objectives are as follows:

- O1. Familiarise the school managers with the latest EdTech trends in Europe;
- O2. Identify the practices in place in the selected schools;

⁵ As per the indicator used in the “*Digital Education Readiness Assessment*”, score 1 shows a latent preparedness, 2 – preparedness in progress, 3 – final preparedness and 4 – advanced preparedness.

⁶ During the COVID-19 pandemics, the Moldovan schools were forced to swiftly explore the digital learning platforms, such as the “Studies” (Education Taskforce for COVID-19, 2020).

O3. Clarify the key obstacles and opportunities in the area of EdTech based on the Survey outcomes.

Yet, the ‘EdTech’ term is not shaped as an independent concept at the institutional or policy level, while its benefits are to be explored, though the MoER has made many endeavour to this end (the Development Strategy “Education 2030”, the Education Code, etc.), and implemented nation-wide projects (“Classroom of the Future”). Therefore, the Study fills in this temporary gap by depicting the level of openness of school managers towards EdTech (in particular, in the rural area, including in schools with limited computer infrastructure) and by identifying various opportunities to facilitate the implementation of EdTech.

1.2 Study Key Features

This Study has been conducted against a background where EdTech is at its launching phase in the Moldovan education institutions. Although many schools unroll the new EdTech ‘identity’, and many endeavours have been made during this timeframe to digitalise the country as a whole, it is important to keep in mind that EdTech finds itself at the incipient phase in the Republic of Moldova (and it is in many countries across the world).

Taking into account the current development level and the peculiarity of the education sector where the reforms are unrolled in a moderate tempo, the Study and its outcomes may be construed as a discussion instrument between the MoER and the educational management to quantify the openness of the latter towards adopting new infrastructures and practical managerial approaches.

The EdTech developments have led to the advancement of a whole system about the learning process called “**Learning Engineering**”⁷ and the use of prominent evidence for a better understanding of the learning process. Starting with the monitoring of classroom hours and the time spent to learn, using a computer, and going further with online assessment of students, the school education goes through transformations that require new knowledge, methods and understandings of EdTech in the teaching process. Herbert Simon, who introduced the term “*Learning Engineering*” (1967), claims that social sciences, as well as education per se, shall be approached with the same precise mathematical principles as physics or engineering. The Study aims to contribute to the advancement of “Learning Engineering” in the Republic of Moldova through:

(1) fostering the school managers **to embed EdTech infrastructure into** their institutions, having facilitated the process of quantifying the students’ performance in the learning process by collecting the relevant data;

(2) offering a wide explanatory framework regarding EdTech vs. ICT and guiding the school managers through the conceptual and practical differences during the digitalisation era and delimiting

⁷ *Learning Engineering* or what we can learn about how we learn.

the most important EdTech trends that are relevant for the country context;

(3) using “*Mobility Era Game*” in it physical and electronic format. Therefore, 15 schools from the Republic of Moldova will be able to compare the game-based learning as an EdTech method (using the “*Mobility Era Game*” application), against the traditional game method (using the table game “*Mobility Era Game*”). All the research subjects are exposed to the EdTech method of game-based learning, and to the **software** to evaluate the tests and exams, which was developed in the Republic of Moldova, named the “*Test Designer*”. Therefore, it is proposed to instantly raise the level of EdTech **hardware** in schools by the practical application of two EdTech instruments.

Moreover, a default revolution takes place in the area of game-based learning – an important EdTech theoretic and practical axis. Though the gaming as a teaching method during the class hours is widely known, as well as the earliest extra-curricular learning method, the technological dimension confers a special role to the game-based learning due to the easiness and efficiency of its use. The game does not require the teacher’s presence, but it can serve as an assessment instrument of students’ skills by going through different levels of difficulty during the game and demonstrating the understanding of the taught subject.

1.3 Report Structure

This Study covers a brief description of the key terms used in the research and explains the relation between EdTech and “Learning Engineering”. The Introduction contains the Study goal and objectives. Section 2 includes a review of the policy and legislative framework related to technology-driven education in the Republic of Moldova. Section 3 delivers the main aspects of the research and the applied methodology. Section 4 describes the Survey outcomes conducted on a sample of 70 school managers from the Republic of Moldova. Section 5 presents the key conclusions of the research and a set of recommendations. The Study references and a series of annexes can be found at the end of this Paper.

2. The legislative and policy framework on education digitalisation in the Republic of Moldova.

Following the review of the legislation and policy related to technology-driven education it has been found that the EdTech concept is sufficiently elaborated, being placed under the umbrella of reforms aiming to integrate the ICT into education. This Section reviews the key policy and legislative acts in this area.

2.1. Legislative framework.

The Moldovan education system is built upon several fundamental laws. Hence, the

Constitution of the Republic of Moldova guarantees the right of access to education through the compulsory comprehensive public school system. Children under the age of three years are educated at home, while their parents receive childcare allowances in compliance with the legislation. In retrospect, we shall mention that since the 1990s significant endeavours were made in the area of education in the Republic of Moldova. The OECD Report (2007) stated that a new legislative framework and education policy were developed in the Republic of Moldova to respond to the new economic, social and political challenges. Hence, in 1999, the Moldovan Government adopted the “*National Education Development Programme*” with the aim to develop and implement the education reforms during 1995 – 2005 (OECD, 2007). The Development Strategy “*Education 2020*” for 2014-2020 describes the vision concerning the education system that shall be affordable to all, be of high-quality and relevant for the country society and economy. The Development Strategy “*Education 2030*” outlines the Government policy in the area of education, describes its contents and implementation mechanism and determines its impact on the education system, society and state in order to optimize the intellectual, cultural and professional education of citizens.

The Development Strategy “*Education 2030*” has brought to light nine challenges concerning the education system development in the medium- and long-term. According to the Strategy, the ICT is an issue for the education system due to the slow progress in promoting new media, open resources and technologies in education, including the inefficient use of ICT in education and its modest provision with modern education software. The Development Strategy “*Education 2030*” depicts some matters due to which more and more schools supplement the ICT infrastructure already in place with EdTech.

Figure 1 (Annex 1) shows the developments of various electronic devices and the use of electronic/technical means in education, which ultimately led to the development of EdTech. For a better understanding of these two axes in education, Figure 2 describes the experience of a teacher from an American School in Singapore.

The ‘EdTech’ concept was mentioned for the first time at the “EdTech Forum Moldova” (2022)⁸ attended also by the MoER of the RM. This event is mentioned in the Development Strategy “*Education 2030*”, where it is underlined, *inter alia*, the lack of a systemic vision regarding the equipment and software used in the education institutions of all levels, which hampers a uniform implementation of modern pedagogies driven by constructivism. Therefore, there is an agglomeration of fragmented ICT solutions used in the education area, and this hinders the implementation of harmonised digital media intended for computer-assisted learning and a reliable education management information system. At the legislative level, digitalisation of education in the Republic

⁸ Electronic reference: <https://mecc.gov.md/ro/content/secretarul-de-stat-adriana-cazacu-participat-la-deschiderea-oficiala-evenimentului-edtech>

of Moldova is mirrored both in the Education Code of the RM (Art. 11 2(e)) and in the Development Strategy “Education 2030”, approved by Government Decision No.114/2023. The Development Strategy “Education 2030” foresees the following: General Objective 6: ***Improve the education system functionality through efficient implementation of digital technologies to ensure education quality and sustainability.*** Figure 3 covers more details concerning this key objective.

Figure 3. Targets and expected results following the implementation of General Objective 6.

<p>Target 6.1. Provide at least 80% of education units with equipment, software and other ICT in line with the national equipping standards for each education level and unit type.</p> <p>Target 6.2. Ensure initial and continuous education for 100% of education sector employees in the area of digital skills and implementation of education computerisation.</p> <p>Target 6.3. Develop the institutional capacity of 80% of education institutions in setting, using and assessing the digital learning means.</p> <p>Target 6.4. Develop and implement higher education programmes through remote teaching.</p> <p><i>Expected results following the implementation of General Objective 6:</i></p> <p>Modern ICT would be employed to essentially contribute to education quality and sustainability:</p> <ol style="list-style-type: none"> 1) by 2030, 80% of education institutions would be provided with equipment, software and other ICT in line with the relevant standards; 2) by 2030 all students and teaching staff will have access to the internet within the institution; 3) by 2030 all education sector employees will be trained to acquire digital skills; 4) by 2030 data processing and reporting on behalf of local specialty bodies in the area of education and of education institutions would be electronically only, through the efficient use of the Education Management Information System. <p><i>The expected impact.</i> Increased performance of the education system driven by digital technologies.</p>

Section 2 is more descriptive and explores the key actions and objectives aimed at using EdTech. For a better acquaintance with the education policy we suggest looking at Figure 4, which displays the priority axes action and sub-programme taxonomic codes to attain this objective.

Figure 4. Development Strategy “Education 2030”, Objective 6: priority axes for action.

<p>General Objective 6. Improve the education system functionality through efficient implementation of digital technologies to ensure education quality and sustainability.</p> <p>The priority axes action:</p> <ol style="list-style-type: none">1) Create new contexts and favourable environments through the interconnection of teaching technologies with IT (Sub-programmes: 8803; 8804; 8805; 8806; 8808; 8809; 8810; 8813; 8815; 8816).2) Provide the education institutions with equipment and software, as well as with ICT (Sub-programmes: 8803; 8804; 8805; 8806; 8808; 8809; 8810; 8813; 8816).3) Provide professional training to the teaching staff from the perspective of efficient use of digital instruments (Sub-programmes: 8809; 8810; 8812).4) Implement the management information systems at all levels of education (Sub-programmes: 8802; 8803; 8804; 8805; 8806; 8808; 8809; 8810; 8813).5) Employ the potential of digital technologies/instruments to enhance the quality of teaching, learning and assessing processes (Sub-programmes: 8802; 8803; 8804; 8805; 8806; 8808; 8809; 8810; 8813).6) Develop and implement new digital monitoring and evaluation instruments to increase the efficiency of the education system, improve the rendered services, streamline the documentation and reporting procedures (Sub-programmes: 8802; 8803; 8804; 8805; 8806; 8808; 8809; 8810; 8813).7) Digitalise the system of recognition of learning/studies in various contexts to foster the educational progress, guide the professional career, provide remote training, ensure lifetime learning and academic mobility (Sub-programme: 8812).8) Develop an electronic enrolment module of children in general education within the Education Management Information System, including in the rural areas with a large number of population;9) Streamline the documenting and reporting procedures for the local specialty bodies in the area of education and for education institutions through efficient use of the Education Management Information System.
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Infrastructure and human capital are two crucial components for ensuring smooth technological transition. Respectively, Axis of action 1 from Figure 4 is of particular interest within this research. As for the human capital which, in particular, refers to Axis of action 3, the country (USA) the EdTech stems from may serve as the best practice, and its case is displayed below. Thus, the 2017 “National Educational Technology Plan” of the U.S. Department of Education contains a Teachers’ Preparation Program aiming to prepare the teachers to efficiently integrate modern technologies in their class hours.

Nonetheless, the relevant research papers have corroborated that many teachers make significant endeavours to integrate IT in the teaching process (Graham et al., 2019; Neumann et al., 2021; Tondeur et al., 2016). Researchers also suggested that although the teachers find themselves in an advanced EdTech context, they are aware of their gaps in terms of IT and have the perception they are not prepared enough to integrate EdTech in the teaching process (Chai et al., 2019; Williams, 2017).

In the Republic of Moldova, it is vital to promote a close dialogue of school leaders and teachers employed in those institutions to identify their needs and the necessary financing. To achieve

Objective 6 within the next two years, the amount of **MDL 541 310 000** is allocated from the National Public Budget. Annex 3 displays the detailed expenditures to this end. According to the relevant professionals, it is difficult to accurately estimate the costs of Programme implementation when lacking the details concerning the ways of implementing the priority actions. Respectively, the accurate costs for implementing the Development Strategy “Education 2030” and the related Programme would be estimated by the MoER and by other central public authorities while undertaking the programme. Pursuant to the Yearbook titled “*Moldova in Figures*”, published by the National Bureau of Statistics (2023), the Moldovan Government allocated for Education 16% of the National Public Budget, this sector being positioned the second 2 in terms of expenditures after social welfare (38%), and being followed by health (14%).

For a more efficient undertaking of any programme it is important to take account of the monitoring and evaluation indicators, which are shown in Figure 5, such as: (1) the average number of students per computer; (2) the capacity to internet connection per student; (3) the share of education institutions equipped in compliance with the ICT standards; and (4) the share of ICT certified teaching staff.

Figure 5. Monitoring and evaluation indicators.

	Indicator	Source	Reference value, 2021	Intermediate target for 2025	Final target for 2030
1.	The average number of students per computer	NBS	9	5	3
2.	The capacity to internet connection per student, Mb/s	MoER	85	270	400
3.	The share of education institutions equipped in compliance with the ICT standards, %	MoER	–	50	80
4.	The share of ICT certified teaching staff, %	MoER	–	25	50

The desired transition from “digital literacy” (an activity specific for the past decades) to “digital pedagogy” is stated in the new Development Strategy “Education 2030” of the Republic of Moldova. In the USA, for instance, the digital pedagogy is proposed to be appraised in compliance with a common set of standards. Figure 6 shows the results of a Case Study, administered in the USA in four phases and a total of 184 teachers to share a standards-aligned instrument designed to evaluating teachers’ EdTech competences. The Survey derived from multiple sets of popular EdTech

standards, leading to the development of an instrument that may be used by the providers of educational programmes, the regional/county/district education directorates, the accreditation agencies or by other education institutions.

Figure 6. EdTech performance-based assessment in the USA (2023).

Area	Statement Creativity
	1. I use technology to engage the students.
	2. I use new emerging technologies in the teaching process.
	3. I use technology to offer differentiated contents in the teaching process.
	4. I promote critical thinking, using EdTech.
	5. I teach how to use technology to solve problems.
Citizenship	6. I teach the ethics of digital communication.
	7. I explore ethical issues related to EdTech.
	8. I use assisted technology to meet the students' needs.
	9. I use technology to explore diversity-related subjects.
Digital literacy	10. I have skills to use EdTech.
	11. I have trouble-shooting skills.
	12. I teach how to assess the accuracy of online contents.
	13. I learn how to be safe online.
Pedagogy	14. I develop learning materials for online access.
	15. I evaluate the contents of digital resources for training.
	16. I evaluate the technological instruments for my teaching practice.
	17. I use technology to communicate with parents or tutors.
	18. I use technology to appraise the students' learning.
	19. I take training-related decisions, being guided by the analysis of the data on students' performance.
	20. I reflect on my EdTech practice.
Leadership	21. I take part in professional communities for technology learning.
	22. I conduct research to improve the EdTech practice.
	23. I collaborate with school decision-makers to promote EdTech-related initiatives.
	24. I know how to manage the implementation of EdTech initiatives in my school.
	25. I advocate for fair access to EdTech.
	26. I shape the best practices in the area of EdTech for my colleagues.
Source: Fegely et al. (2023) EdTech Align: a Valid and Reliable Instrument for Measuring Teachers' EdTech Competencies Aligned to Professional Standards. TechTrend	

In conclusion, in view of implementing the Development Strategy “Education 2030”, the MoER of the RM identified three key sectors that required more attention (OECD, 2023). These three key sectors are as follows: 1) professional development of teaching staff and of other professionals working in the area of education; 2) curriculum and learning resources; and 3) evaluation of programmes and of vocational education and training (VET) institutions aimed at improving their operation. The analysis of the legislation in force indicates the need to prioritise the EdTech incorporation, a significant budget being required to this end.

2.2. EdTech projects and game-based learning positive practices in Moldova

The legislative framework in force involves the review of regulatory and legislative acts that need to be followed and applied, while the educational policy framework comprises a set of programmes and actions developed in a specific educational sub-sector, based on a real issue. In this Section we shall discuss the first occurrences of EdTech in the Republic of Moldova and its current trends.

McAleavy (2018) mentions the so-called '*learning crisis*'. The World Bank (2018) found that learning at a 'universal' school is necessary, but not sufficient. This crisis is specific, in particular, for developing countries, where the learning results are net inferior to those recorded in the developed countries. To address the learning crisis caused by the low motivation of children from the Republic of Moldova or the need for changing the traditional pedagogical practices, EdTech measures have been implemented, prevailing, ICT, mirrored in the Development Strategy "*Education 2030*". The most important initiatives in the area of education are displayed below⁹:

- Memorandum of Collaboration with Google, launching the "Google for Education" programme in the Republic of Moldova in 2020;
- *EdTech Moldova Forum* conducted in 2022. The initiative was a novelty for the Southern region of the country, and was conducted under the "EU Tech Days", part of the "EU4Moldova Startup City Cahul" Project, implemented by the Association of ICT Companies (AICT) of the Republic of Moldova, with the financial assistance provided by the European Union in partnership with Sweden. The event was conducted in collaboration with Cahul City Hall and State University "B.P. Hasdeu" from Cahul;
- "*Classroom of the Future*" is a project of digital transformation of education, implemented in the Moldovan education institutions, which is built upon the national project "Educational Robotics", both being STEAM (science, technology, engineering, arts, math) initiatives;
- Public-private partnerships (PPP) concluded by the MoER; the "Technologies of the Future" Project financed by the USAID, Sweden and the United Kingdom; Orange Moldova Foundation. The development partner: Development Services Foundation from Liechtenstein (LED). The Project Implementing Partners are the State Pedagogical University "Ion Creanga" and the Educational Advising Centre. Google is the technological partner of "*Classroom of the Future*". Thus, in 2023 Google allocated

⁹ The latest news in this area can be found at: <https://startupmoldova.medium.com/>.

USD 1 million¹⁰ for the digitalisation of education, a partnership facilitated by USAID;

- *TEKWILL* is a programme hosted by Moldova Technical University (TUM) and established with the assistance of the USAID and the Swedish Government through SIDA within the “Developing the ICT Centre of Excellence in Moldova” Project. The latter is implemented by the AICT in partnership with TUM. It is worth mentioning the Tekwill Academy – a training programme for professionals in the area of IT and guidance in professional development. The Programme facilitates the entrance of higher school graduates on the labour market, depending on their individual talents/skills and the real needs of local employers.

While considering certain policies, Mohan (2016) asserted that it was important to pay greater attention to the way how the legislative framework and previous commitments under the public policies affected the awareness of the issue concerned. Therefore, in this Study, the Author considers such initiatives to be a set of incipient education policies (for instance, developing a national education programme to implement the STEM through programmes such as the “Classroom of the Future”), and recommends to review the legislative framework underpinning the EdTech integration.

3. Research Methodology.

Pursuant to the available statistics, there are 1218 primary and secondary education institutions in the Republic of Moldova (NBS, 2023). This Study includes a survey conducted on a sample of 70 respondents who represented secondary education institutions from almost all districts of the country (their list can be viewed in the section “**Acknowledgments**”). The Questionnaire (shaped in Google Forms) was disseminated online. The filled in Questionnaires were collected in the same manner. The Questionnaire comprised 42 multiple-choice, open and closed questions. It also included three introductory/explanatory videos related to EdTech and a set of practical exercises based on a mobile game application. Although the Questionnaire was addressed to school managers, circa 10% of it was filled in by teachers who work for those institutions (due to the lack of time mentioned by school managers). The Questionnaire was shared online by the MoER through the General Education Directorates.

Through this research we aim to combine EdTech with Game-based learning and propose the school leaders a specific approach to integrate such an instrument in the school curriculum. The societal game and the electronic application “Mobility Era Game” have been certified by the World Economic Forum, Forbes Council, STEM.org and by TaxEdu of the European Commission. Likewise, we shall use other similar examples to increase the motivation for enhancing EdTech in schools, under any

¹⁰ Online source: Moldova 1 <https://moldova1.md/p/16213/google-to-donate-1-million-to-moldovan-cybersecurity>

shape that is appropriate for the region where the education institution is located. Due to this reason, we believe that the game-based learning is necessary, using a physical instrument (such as a table game), as well as an accessible electronic application (that promotes the same message as the table game) to ensure connection with EdTech.

4. Research Results

The conducted Survey will be described in the sequence of questions and sections as they appear in the Questionnaire. Two out of 70 respondents stated they hold dual positions (school leader and teacher). Due to the shortage of school teachers/educators, the school leaders are frequently forced to hold two positions. Likewise, it is an acceptable practice for a teacher who works in an education institution to subsequently become the school leader or deputy school leader as they know closely the school situation and have the necessary leadership skills. Thus, 75% of respondents are school managers, 15% are deputies or hold this position through cumulation, while 10% of respondents are teachers (Computer Science, Chemistry, Math or Foreign Languages).

Figure 7. Breakdown of answers by work positions.

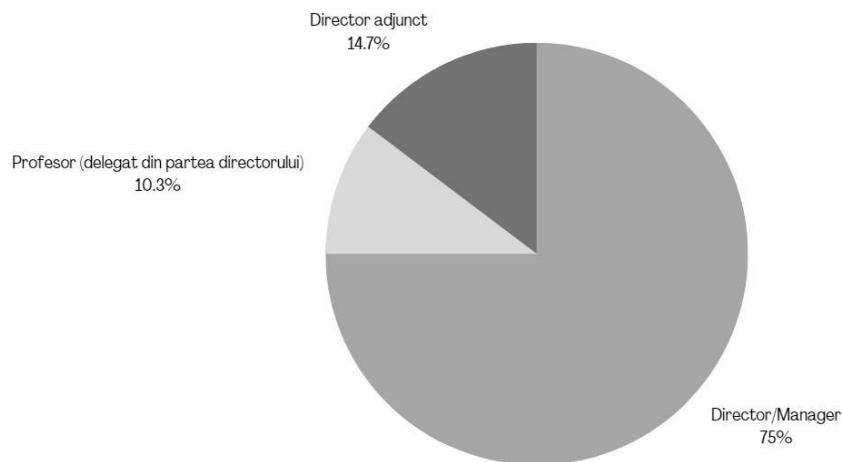
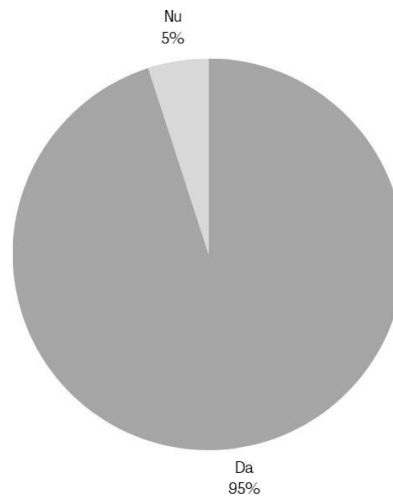


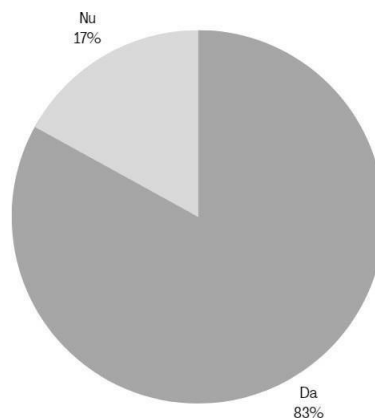
Figure 8 shows a significant share of education institutions, involved in the Survey, which have a computer classroom.

Figure 8. Do you have a computer classroom at the education institution you lead?



However, not all schools have the classical package of computer class hours in their curriculum, namely the IT course (Figure 9), and not all schools have these classrooms connected to the internet (Figure 10).

Figure 9. Do you have IT class hours in the school you lead?



Moreover, not all computer classrooms are connected to the internet (Figure 10).

Figure 10. Is the computer classroom connected to the internet?

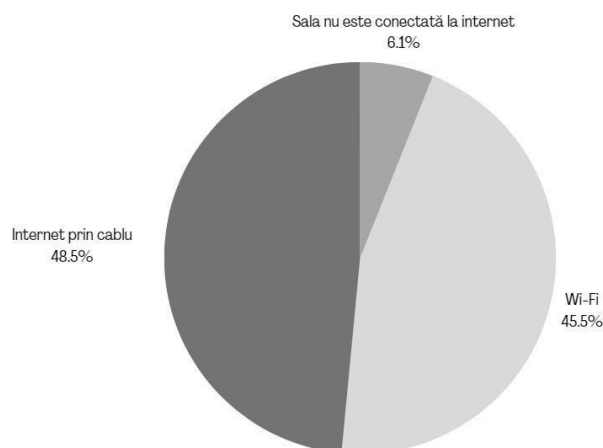
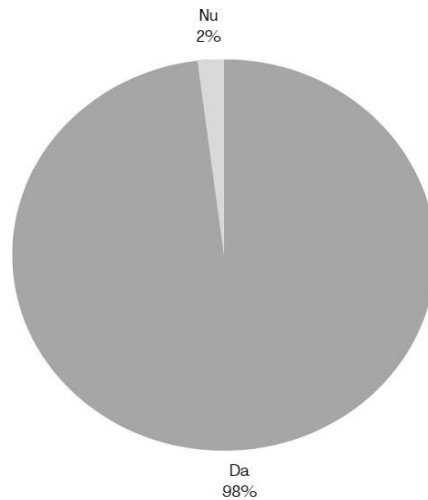
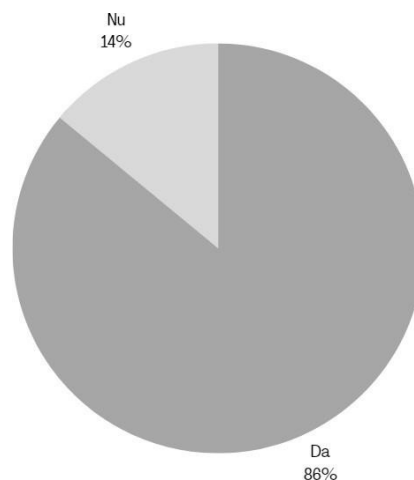


Figure 11. Are you open to test/apply different EdTech methodologies in the education institution you lead?



The reason behind the negative answer given by some of the respondents to the question shown in Figure 11 was the lack of access to the internet. Circa 84% of school leaders stated that the implementation of EdTech would help the students learn better. Only 2% of respondents believe that success depends on the authorities, 14% of respondents think that teachers play a major role in ensuring students' better performance with the aid of EdTech, while the others mentioned that success depends on students.

Figure 12. Based on your experience, do you think that implementing EdTech would significantly help the students learn better?



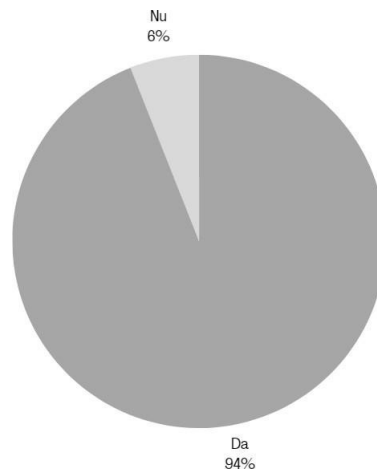
An important aspect of using EdTech is cutting down the number of activities/responsibilities fulfilled by teachers so that they have more time to communicate with the students and perform their assessment. Nonetheless, almost half of school leaders (43%) do not believe this desideratum could be attained with the aid of EdTech. This research aims to combine EdTech with game-based learning and follow a specific approach of integrating such an instrument in the school curriculum.

Figure 13. Based on your experience, do you believe that implementing EdTech would significantly help cutting down the teacher's workload?



We would like to sensitise the school leaders and get them acquainted with the latest trends in the field of education from the EdTech lens. If the school leaders failed to be passionate about EdTech, we would try to make them passionate, using the “Mobility Era Game” and other similar examples in order to increase their motivation to use EdTech in their schools, under any possible shape depending on the region there their school is located. Due to this reason, we deem game-based learning is necessary, using a physical instrument (such as a table game), as well as an available/affordable electronic application (that promotes the same message as the table game) to ensure connection with EdTech.

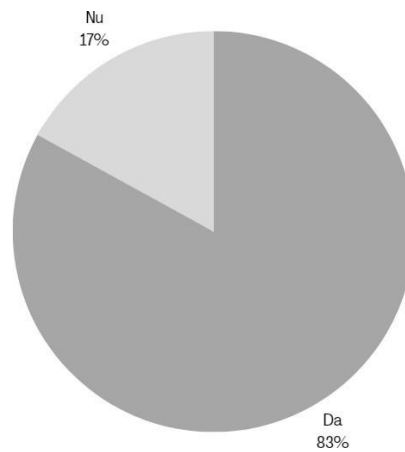
Figure 14. Do you think that educational games are welcomed as part of the school curriculum?



Although 94% of school leaders believe that the educational games are welcomed as part of the school curriculum, 6% of them think that game-based learning has some shortcomings too, such as the rational use of time. Nonetheless, 45% of school leaders would instantly implement educational games as part of school curriculum (Annex 3).

Further, it was suggested to test the “Mobility Era Game”, which application was successfully downloaded by circa 83% of school leaders on their smartphone.

Figure 15. Have you successfully downloaded the “Mobility Era Game” application?



Out of those 83% respondents who downloaded the application, circa 50% managed to go through the game and make an impression. Out of those 50% respondents, half of them is aware that EdTech games are used as an assessment instrument of students' performance.

Figure 16. Are you aware that in many schools across the world, teachers can use games to appraise students' performance in terms of subject understanding/learning?

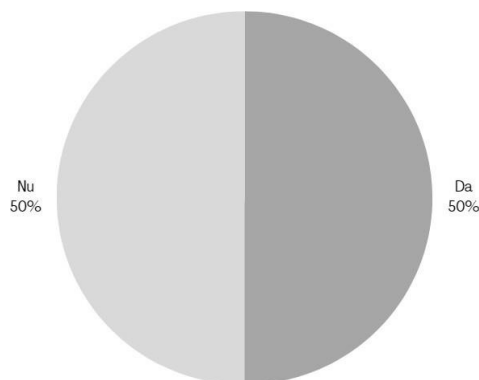
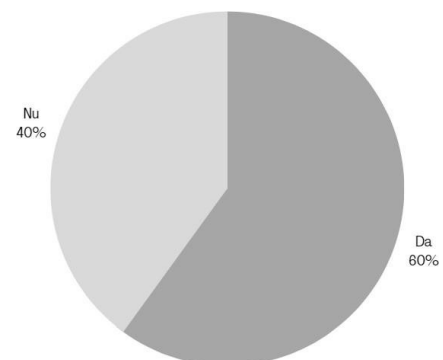


Figure 17. Would you trust in the students' performance results derived from applying an electronic or table game?



Nevertheless, more than half (60%) of those who are familiar with the aforementioned statement do not think that educational games can be used as an assessment instrument. The game-based learning presupposes the inclusion of educational materials in a game through which the teacher would introduce a concept or process to students, enabling them to practice what they learned in an environment that is not exposed to any risk (EdTech Magazine, 2022). A game is an activity usually involving skills, knowledge or chance, in which you follow fixed rules and try to win against an opponent or to solve a puzzle (definition taken from the Collins English Dictionary).

5. Conclusions and recommendations

One of the key conclusions of this research is that EdTech are welcomed and desired by school

leaders, as long as they are supported with training programmes and appropriate policy. Keeping in mind that the school curriculum and guidelines in force are pretty theoretical and academic, lacking a coherent structure (UNICEF, 2019) and despite the challenges imposed by the infrastructure, budget or policy constraints, discussed in Section 2, the education system in the Republic of Moldova managed to cope with online education during the COVID-19 pandemic and continues its advancement. Therefore, this Survey demonstrates a high level of adaptability and openness of school managers towards the new requirements. This is mirrored in the endeavours made by education management, who showed a great interest and openness towards adopting EdTech.

Managers of education institutions from the rural areas showed particular interests towards EdTech as such programmes can fill the gaps when there is no need to have computer classrooms or internet connection in the school. Personal smartphones, i-Pads or laptops have acquired a new connotation in light of the discussions held during the technical webinars organized after the Survey. Therefore, the EdTech concept may be supportive to bring up the schools from the rural areas to match the development level of urban schools. Such gap is difficult to fill by ICT, and this matter was tackled in the Development Strategy “Education 2030”.

There is through a high level of skepticism that EdTech could cut down teachers’ workload (43%), numerous studies show positive practices in this regard. Nonetheless, it stands out that the use of EdTech games in the educational and assessment process is less desired and explored. In comparison with physical games, the electronic ones are an immense source of information to back-up the material less/poorer learned by students and combined with the artificial intelligence (e.g. “Duolingo” for learning foreign languages). Such games can be a funny and limitless learning source for the students and a way of appraising students’ performance by teachers.

In conclusion, the research outcomes show a high degree of adaptability and openness of school leaders from the Republic of Moldova towards EdTech and a moderate level of including educational games in the school curriculum; (2) a more enhanced information coverage in the urban area in terms of the latest technological developments in comparison with the rural area; and (3) a high degree of skepticism towards the use of EdTech games in the school curriculum (given that the games could be used as an attention-diverting instrument rather than an instrument to learn the taught material).

Therefore, the following recommendations have been outlined:

1. Computerizing and shaping a common standard with the EdTech support could be that key element that is desired and mentioned in the Development Strategy “Education 2030” as a shortcoming or as a major difficulty. For instance, should we refer to ICT and EdTech as two separate technological axes (Learning Engineering being the third one), then it does not matter what devices (desktop computers, laptops, i-Pads, smartphones or interactive board) are used for EdTech. What really matters is the available software/applications and for what purpose

they are used (for instance, “*Duolingo*” application to learn foreign languages is considered an EdTech instrument and can be used by everybody elsewhere, even during the classroom hours). Therefore, standardizing the instruments used in the rural and urban areas, as well as harmonizing the types of EdTech instruments used at different levels of education can be achieved more swiftly with the EdTech support. Moreover, the “*EdTech School*” wording could provide each schools with a sentiment of pride and alignment with the latest technological trends in good time and in line with the pre-established standards.

2. The availability of as many EdTech organisations and associations as possible, which promote, through research and piloting, various EdTech instruments aimed at making education more efficient, could align the Republic of Moldova with the latest ICT trends in Europe, such as the EdTech Associations from Lithuania, Belgium, France, the Netherlands or the Umbrella Association “EdTech Alliance”. EdTech professional associations have been developed in the USA, as well as shared standards to guide/advise the state/county education directorates and other education institutions how to integrate technologies in the teaching process (Tondeur et al., 2016).
3. Either in the shape of ICT or EdTech, the Development Strategy “Education 2030” covers limited mechanisms to implement the education computerisation standards, revealing the lack of such priorities in the policy documents. This could be improved by exploring the EdTech compatibility with ICT and discussing the policy through which EdTech could be transformed in an overarching mechanism to fill in the ICT gaps. It is recommended to establish an EdTech Association, which members would have the opportunity to express their views concerning this topic and the best practices, which are spread across the world.
4. For the new Development Strategy “Education 2030” it is advised a transition from “digital literacy” (an activity specific for the past decades) to “digital pedagogy”. In the USA, digital pedagogy is appraised in compliance with five criteria, which can be easily discussed and reviewed to be subsequently applied for a sample of teachers who would like to apply EdTech approaches (Case Study, Figure 6).
5. It is encouraged to use the games as a safe assessment method as long as the key objectives of the basic material are followed and attained (Figure 16 and 17; the liaison of EdTech with games is explained in the OECD report (2021)).
6. The Authors of the UNESCO Study (2023) believe that pursuant to the world-wide experience, one of the key challenges in using EdTech is that the majority of people do not understand how such are operated and what is (not) expected from them. The AI is an essential example, as nowadays it is impossible to fully explain why it is so efficient, keeping in mind its potential negative effects as well. We strongly recommend the practice applied by the Dutch educators

(NOT Onderwijs), such as conducting an EdTech fair (two days) to be attended by all teachers and students who are interested in EdTech in order to try/acquire various devices/games/electronics and get familiarized with the latest trends in this area.

7. Finally, it is recommended to conduct as many online technical webinars as possible, such as those mentioned in Annexes 6 and 7, in particular, with the representatives of education institutions from the rural area to support the process of standardizing and harmonizing the EdTech knowledge for all, not just for those who are extensively exposed to information flows, such as the central and urban areas. Such discussions do not require physical presence, but could be of paramount importance both for the school leaders and the teaching staff.
8. Learning Engineering or the arts of learning about the way how we learn, being assisted by a computer is a relatively new subject for the Republic of Moldova and evolves directly with the use of EdTech instruments on a wider scale, which would enable collecting the data and the performance outcomes to be used as pillars while considering the strengths and weaknesses of the material taught and learned. It is recommended to keep in mind the primary and key purpose of using a computer in the learning environment, namely to develop reviews or studies based on the collected data to define the trends and identify opportunities to combat low motivation of students in comprehending the subject substance, or the *learning crisis*.

Acknowledgments.

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Anenii Noi	PI TL "Andrei Straista"	Hincesti	PI Education Complex gymnasium / kindergarten Pervomaiscoe
	PI Primary school-kindergarten of Mereni Village		PI Gymnasium Hincesti
	PI Gymnasium Gura Bicului		PI GM Bozieni
Cahul	PI TL "Ion Creanga"		PI Casa de Cultura Mingir
	PI Gymnasium "A.Puskin", com. Burlaceni	Leova	PI Gymnasium Saratică Noua
Cantemir	PI Gymnasium Haragis		PI Gymnasium Tochile-Raducani
	PI TL "D. Cantemir"		PI Gymnasium Cupcui
Calarasi	PI TL "Mihai Eminescu"		PI Gymnasium Ceadir-Lunga
	PI TL "Mihail Sadoveanu"	Ocnita	PI Gymnasium Birnova
	PI Gymnasium "Pavel Tihon"		PI Gymnasium-kindergarten "Petru Sargu"
Causeni	PI Gymnasium "Dimitrie Cantemir"		PI Gymnasium Corestauti
	PI TL "Alexandru cel Bun" Tighina		PI TL "Mihail Sadoveanu"
	PI Gymnasium "Gr. Vieru"		PI TL "Gheorghe Biruitorul"
Chisinau	PI TL "A.I.Cuza"		PI Gymnasium "Vitalie Tonu"
Criuleni	PI Gymnasium "Mihai Eminescu" Jevreni	Orhei	PI Gymnasium Bravicieni
	PI Gymnasium "Hirtopul Mic"		PI Gymnasium Pohrebieni
	PI TL "Mihai Stratulat"		PI Gymnasium "Tamara Ciobanu", Berezlogi
	PI Gymnasium "Regele Mihai I", Cimiseni Village		PI Gymnasium Zorile
	PI Gymnasium "Ion Sârbu", Mascauti Village		PI Educational Complex Gymnasium-kindergarten Neculaieuca
Glodeni	PI TL "Lev Tolstoi"		PI Gymnasium Morozeni
	PI Gymnasium Sturzovca		PI Gymnasium "D Cantemir" Ciocilteni Village
	PI Gymnasium Limbenii Vechi	Riscani	PI Gymnasium Galaseni, Galaseni Village
	PI Gymnasium Ciuciulea		PI TL Varatic
Donduseni	PI Gymnasium Criscauti		PI Gymnasium "Valeriu Ghereg", Pirjota Village
	PI Gymnasium Mosana	Singerei	PI Gymnasium "Ion Ignatiuc", Prepelita Village
	PI Gymnasium Taul	Soroca	PI Primary school-kindergarten "V.Apostol", Dubna Village
	PI Gymnasium Limbenii Vechi		PI TL Visoca
	PI Gymnasium "Igor Vieru"	Straseni	PI Gymnasium Codreanca
Drochia	PI Gymnasium Zgurita	Soldanesti	PI TL "Alexei Mateevici"
	PI Gymnasium Nicoreni	Stefan Voda	PI TL BPH
Dubasari	PI TL Dorotcaia		PI Gymnasium "Stefanesti"
Falesti	PI Gymnasium "Nicolae Dabija", Pinzarenii Village		PI Gymnasium "Grigore Vieru", com. Purcari, branch of Gymnasium Viisoara
	PI Gymnasium "Vasile Alecsandri"		PI Gymnasium "Ecaterina Malcoci"

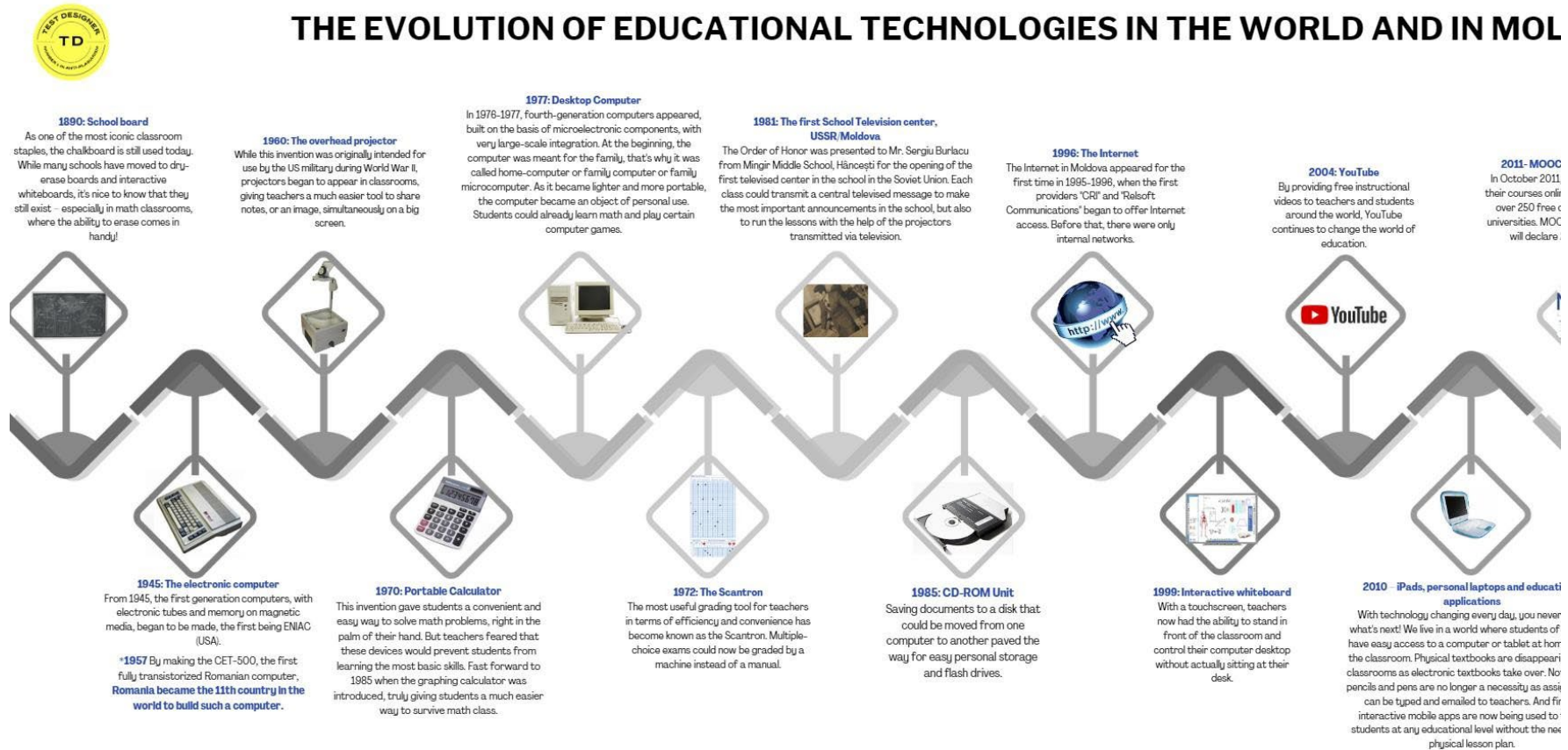
6. References:

- 1) The World Bank (2018), *Learning to Realize Education's Promise*. Washington, DC: World Bank. [Online source: <http://www.worldbank.org/en/publication/wdr2018>]
- 2) Biroul Național de Statistică (2023), *Moldova în Cifre*, Breviar Statistic.
- 3) Fegely, A., Winslow, J., and Lee C.Y., (2023) *EdTech Align: a Valid and Reliable Instrument for Measuring Teachers' EdTech Competencies Aligned to Professional Standards*. TechTrends (2023). <https://doi.org/10.1007/s11528-022-00824-8>
- 4) McAleavy T., Hall-Chen A., Horrocks S., Riggall A., (2018) *Dezvoltare profesională susținută de tehnologie pentru profesori: Lecții din țările în dezvoltare*. Education Development Trust, Education Development Trust Highbridge House.
- 5) McGrath C. and Akerfeldt A. (2018), *Educational Technology (Edtech): Unbounded Opportunities or Just Another Brick in the Wall?* (pp. 143 – 157) in *Digital Transformation and Public Services* by Routledge.
- 6) Mohan A. (2016), *Modelul metodologic de analiză a politicilor publice construit de Eugene Bardach*, Universitatea din București, https://www.researchgate.net/publication/311908104_Modelul_metodologic_de_analiza_a_politicilor_publice_construit_de_Eugene_Bardach
- 7) OECD (2007), Synthesis Report and Chapter 6 *Moldova in Education Policies for Students at Risk and those with Disabilities* in South Eastern Europe: Bosnia-Herzegovina, Bulgaria, Croatia, Kosovo, FYR of Macedonia, Moldova, Montenegro, Romania and Serbia.
- 8) OECD (2021), *Digital educational Outlook 2021: Pushing the Frontiers of with Artificial Intelligence, Blockchain and Robots*, OECD Publishing, Paris.
- 9) OECD (2023), *An assessment of the professional development of teachers and school leaders, and curriculum and learning resources in Moldova* from the project “Support to implementation of education policies in Moldova”.
- 10) Rodriguez-Segura D. (2022), EdTech in Developing Countries: A Review of the Evidence, The World Bank Research Observer, Volume 37, Issue 2, Pages 171–203, <https://doi.org/10.1093/wbro/lkab011>
- 11) Strategia de Dezvoltare „Educația 2030”, online reference: https://gov.md/sites/default/files/document/attachments/subiect-02-nu-900-mec-2022_1.pdf
- 12) Tobolcea I., Pentiuc S., and Danubianu M. (2023). *Folosirea tehnologiei informației și comunicării în procesul de învățare a copiilor cu cerințe educaționale speciale*.
- 13) Trofimov V. și Pintilei N.A. (2020), *Analiza tendințelor moderne ale managementului în domeniul educației*, în *Relevanța și calitatea formării universitare: competențe pentru prezent și viitor*, Editura: Universitatea de Stat „Alecu Russo” din Bălți, Vol. (1): 104-110.
- 14) UNESCO (2023), *Global Education Monitoring Report, 2023: Technology in Education - A Tool on Whose Terms?*, UNESCO, <https://doi.org/10.54676/UZQV8501>.
- 15) UNICEF (2019) Republic of Moldova: Review of the evaluation and assessment in education, UNICEF, <https://www.unicef.org/moldova/en/reports/review-evaluation-and-assessmenteducation-0>.
- 16) World Bank (2022), *Moldova – Digital Awareness Education Assessment 2021-2022* by Rajasekaran S. and Casap L.

- 17) World Development Report (2022), *Finance for Equitable Recovery*
<https://openknowledge.worldbank.org/server/api/core/bitstreams/e1e22749-80c3-50ea-b7e1-8bc332d0c2ff/content>
- 18) *A Call to Action for Closing the Digital Access, Design, and Use Divides*. 2024 National Educational Technology Plan. January 2024. US Department of Education. <http://tech.edu.gov>

Annex 1.

Figure 1. EdTech Developments (globally and in the Republic of Moldova).



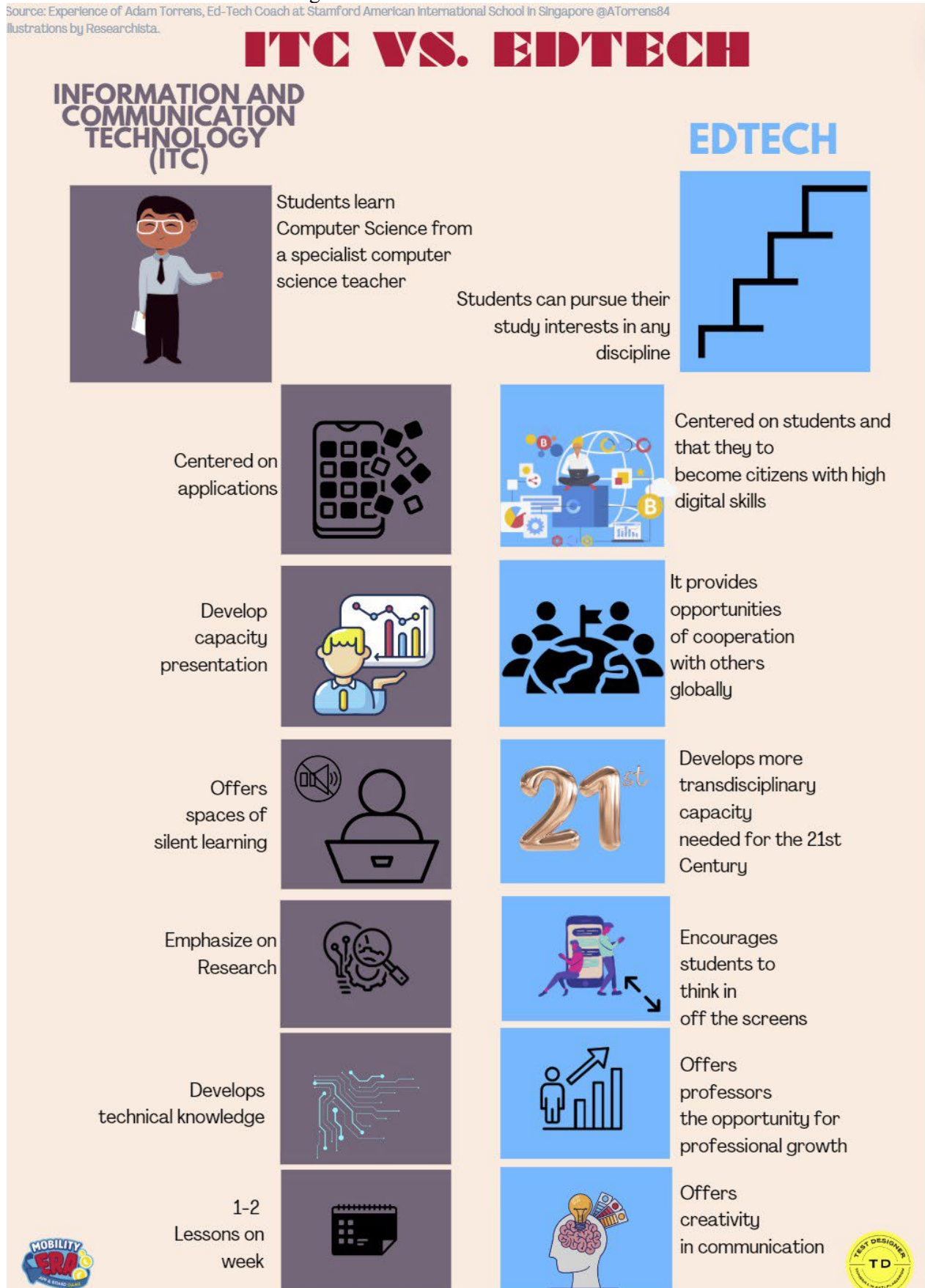
Sources:

[Evolution of Tech in Classroom](#) (link)
[Institutul de Dezvoltare a Societății Informaționale](#) (link)
[Istoria Informaticii în România](#) (link)

Sources: [Evolution of Tech in Classroom](#) (link), [Institute of Information Society Development](#) (link), [History of Computer Science in Romania](#).

Figure 2. Practical difference between ICT and EdTech.

Source: Experience of Adam Torrens, Ed-Tech Coach at Stamford American International School in Singapore @ATorrens84
Illustrations by Researchista.



Online source: <https://www.cognita.com/thought-leadership/ict-classes-vs-ed-tech-integration-explained/> Adam Torrens experience, Ed-Tech Coach la at the American School "Stamford" from Singapore

Annex 2.

Development Strategy “Education 2030”: Planned Outcomes.

According to the Development Strategy “Education 2030”, by 2030, it is expected to:

- 1) ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes (Sustainable Development Objective 4.1);
- 2) , ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university (Sustainable Development Objective 4.3);
- 3) substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship (Sustainable Development Objective 4.4);
- 4) eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations (Sustainable Development Objective 4.5);
- 5) ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture’s contribution to sustainable development (Sustainable Development Objective 4.7);
- 6) enhance the quality of the initial and continuous education system of the teaching staff, increase the attractiveness of teachers’ professional activity and of their status, which should provide the education system with a required number of teachers/educators, with other skilled professionals by having restructured the system of initial and continuous education;
- 7) build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all;
- 8) develop a synergy system to integrate the new ICT with the EdTech, which should ensure high performance of those who learn;
- 9) ensure a maximum level of connection and interconnection with the labour market and community, as a condition to make the operation of the education system more efficient;
- 10) create favourable learning environments that would ensure the development of those who learn depending on their potential, opportunities and own interests (promote student-centred education);
- 11) constitute and develop a system of non-formal education for children, school students, young people and adults as a form of carrying out lifetime learning;
- 12) develop a system to ensure feed-back in education and pedagogical research as a means for quality assurance and learning performance;
- 13) employ social cohesion and welfare to offer quality education and enhance the ownership of society, community, family regarding the education and learning;
- 14) anchor a concept, as well as a cyclical and continuous development mechanism for the school curriculum focused on the context, labour market needs, on the needs and opportunities of those who learn;
- 15) create conditions to develop inclusive education institutions with high organisational and educational culture;
- 16) promote an effective, democratic educational management that is open to change;
- 17) employ the paradigm of entrepreneurial and economic education, which would cover the majority of the population;
- 18) create a system of educational marketing that would regulate the labour market needs, the educational supply, opportunities and perspectives of vocational, secondary professional and higher education;
- 19) promote balanced inter- and multicultural education policy, as well as the conditions to integrate the minorities of the Moldovan society;
- 20) improve the gender relations within the educational framework and, through education, at the society level.

Annex 3.

Objective 6 from the Action Plan of the Programme aimed to implement the Development Strategy “Education 2030”

Targets	Short- and medium-term measures	Monitoring indicators	Implementing costs, thousands of MDL	Funding sources		Deadlines	Responsible authorities/institutions	Partners
				NPB	external sources			
1	2	3	4	5	6	7	8	9
6.1. Provide at least 80% of education units with equipment, software and other ICT in line with the national equipping standards for each education level and unit type	6.1.1. Mapping the ICT means possessed by education institutions	Database with the mapping results	500.0	500.0	0.0	Quarter IV, 2023	MoER	
	6.1.2. Equip the education institutions with ICT means	Share of education institutions equipped in compliance with the ICT standards, the expected annual growth rate being 10%; Share of classrooms/training halls/laboratories equipped according to the standards, the expected annual growth rate being 10%; Number of students per computer, the expected annual reduction rate being 10%.	300 000.0	0.0	300 000.0	Quarter IV, 2025	MoER	Local public authorities
	6.1.3. Increase the internet connection capacities of education institutions	The internet connection capacity per institution, the expected annual growth rate being 50%; The internet connection capacity per classroom, the expected annual growth rate being 30%; The internet connection capacity per student, the expected annual growth rate being 25%	38 726.8	0.0	38 726.8	Quarter IV, 2025	MoER	Local public authorities
	6.1.4. Develop a national logistic base on digital education	The Education Sector information network (MoldEduNet) operational in 2023	83 908.1	0.0	83 908.1	Quarter IV, 2025	MoER; e-Governance Agency	Local specialty bodies in the area of education
		The Education Sector National Portal (MoldEdu) operational in 2023; The Education Management Information System (SIME) expanded to embed the new data in						

		2023; The Education Management type Information System of education institutions (SIM-II) operational in 2025; Share of education institutions that implemented SIM-II, the expected annual growth rate being 10% The Education Management type Information System of local specialty education bodies (SIM- OLSDI) operational in 2025; Share of local specialty education bodies that have implemented SIM-OLSDI, the expected annual growth rate being 10%; The National Education Management Assessment System (SIM-EN) operational in 2025.						
	6.1.5. Develop a Higher Education Management Information System	Higher Education Management Information System (HEMIS) developed	27 000.0	0.0	27 000.0	Quarter IV, 2025	MoER	
6.2. Ensure initial and continuous education for 100% of education sector employees in the area of digital skills and implement education computerisation standards	6.2.1. Update the standards of digital competences of teaching staff	Standards updated and approved	600.0	0.0	600.0	Quarter IV, 2024	MoER	
	6.2.2. Update the standards of digital competences for school leaders	Standards updated and approved	600.0	0.0	600.0	Quarter IV, 2024	MoER	
	6.2.3. Develop a Methodology to certify the digital competences of school leaders and of teaching staff	Methodology developed and approved	500.0	0.0	500.0	Quarter IV, 2024	MoER	
	6.2.4 Set the centres to certify the digital competences of school leaders and teaching staff	At least four centres created, at least one centre in each region, i.e. North, Centre, South, ATU Gagauzia	2 100.0	2 100.0	0.0	Quarter II, 2024	MoER	
	6.2.5. Certify the digital competences of teaching staff	Share of certified teaching staff, the expected annual growth rate being 10%	20 000.0	10 000.0	10 000.0	Quarter IV, 2025	MoER	Local specialty bodies in the area of education
	6.2.6. Certify the digital competences of school leaders	Share of certified school leaders, the expected annual growth rate being 10%	10 000.0	5 000.0	5 000.0	Quarter IV, 2025	MoER	Local specialty bodies in the area of education
	6.2.7. Update the	Share of updated	5 000.0	2 000.0	3 000.0	Quarter IV,	MoER	

	qualifications and the initial education programmes of teaching staff as per the Standards of digital competences	qualifications, the expected annual growth rate being 10%				2024		
		Share of updated initial education programmes, the expected annual growth rate being 10%	600.0	600.0	0.0	Quarter IV, 2023	MoER	
	6.2.8. Update the continuous education programmes of teaching staff as per the Standards of digital competences	Share of updated continuous education programmes, the expected annual growth rate being 10%	600.0	600.0	0.0	Quarter IV, 2024	MoER	
	6.2.9. Continuous education of school leaders and teaching staff in order to facilitate passing the certification exams for digital competences	Share of teaching staff who attended continued education courses, the expected annual growth rate being 5%	10 000.0	5 000.0	5 000.0	Quarter IV, 2024	MoER	
		Share of school leaders who attended continued education courses, the expected annual growth rate being 10%	1 000.0	500.0	500.0	Quarter IV, 2023	MoER	
6.3. Develop the institutional capacity of 80% of education institutions in setting, using and assessing the digital learning means	6.3.1. Update/ develop a Methodology for remote training based on the qualitative and quantitative results of recent studies/research and the need to reshape the learning competence to learn online; "Online quality education for all"; "Education never ends"	Methodology for remote training in different contexts	430.3	0.0	430.3	Quarter IV, 2024	MoER	Local specialty bodies in the area of education; profile institutions and NGOs
	6.3.2. Expand the promotion of digital education best practices through the public radio and TV broadcasts, through campaigns/thematic programmes addressed to different categories of educational actors	Specialised broadcasts.	1 500.0	1 500.0	0.0	Quarter IV, 2025	MoER	

	6.3.3. Initiate some Adaptive learning programmes for adults and for children/young people under changed/new training conditions	Adaptive learning programmes	1 300.0	1 300.0	0.0	Quarter IV, 2025	MoER	
	6.3.4. Provide diversified educational offers/packages, online inclusive, for children with SEN, for children from remote areas with no internet connection	At least 60% of children with SEN recipients of diversified educational offers	21 514.9	10 000.0	11 514.9	Quarter IV, 2025	MoER	Local specialty bodies in the area of education
	6.3.5. Implement a single <i>e-admission</i> system to make the access to higher education more efficient	The <i>e-admission</i> system in higher education implemented for all recipients	15 000.0	0.0	15 000.0	Quarter IV, 2023	MoER	Higher education institutions
6.4. Develop and implement higher education programmes through remote teaching	6.4.1. Develop the managerial, curricular, technological and methodological requirements regarding the organisation of remote studies	Higher education programmes carried out through remote teaching	430.3	430.3	0.0	Quarter IV, 2025	MoER	Education institutions
TOTAL GENERAL OBJECTIVE 6			541 310.4	39 530.3	501 780.1			

Annex 4.
Support materials on “Educational Games”.

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EDUCATIONAL GAMING SUPPORT

Financial and Civic Education Webinar
by Mobility Era Game

**Proiectul Tehnologiile Educaționale și Educația în bază de Joc,
BRD_DEH 2023**

Cite this article: “A study on the transition from ICT to EdTech and Game-based Learning. The Case of Moldova through the Lens of Education Managers”

TYPES OF GAMES

There are numerous types of games, each falling into various categories based on their rules, objectives, and gameplay styles. Here are some of the main types of games:

1. **Board Games:** Played on a physical board or surface, these games often involve moving pieces, strategy, and competition. Examples include Chess, Monopoly, and Scrabble.
2. **Card Games:** Played with a standard deck of cards or specialized card sets. Popular card games include Poker, Bridge, Solitaire, and Uno.
3. **Video Games:** Electronic games played on gaming consoles, computers, or mobile devices. They can be further categorized into various genres, such as action, adventure, puzzle, and role-playing games.
4. **Puzzle Games:** Focus on problem-solving and mental challenges. Examples include Sudoku, crosswords, jigsaw puzzles, and video games like Tetris.
5. **Educational Games:** Designed to teach or reinforce specific knowledge or skills. Educational games can cover a wide range of subjects, from mathematics to language learning.
6. **Role-Playing Games (RPGs):** Players assume the roles of characters in fictional settings and engage in adventures. Tabletop RPGs like Dungeons & Dragons and video game RPGs like Final Fantasy fall into this category.
7. **Sports:** Physical games involving physical exertion or skill. Common sports include soccer, basketball, tennis, and swimming.
8. **Strategy Games:** Emphasize decision-making and planning. Strategy games can be board games like Risk or video games like Civilization.
9. **Card Collecting Games (CCGs):** Players collect and build decks of cards and compete against each other. Magic: The Gathering and Pokémon Trading Card Game are examples.
10. **Simulation Games:** Simulate real-world activities, experiences, or systems. This category includes flight simulators, city-building games like SimCity, and life simulation games like The Sims.
11. **Adventure Games:** Focus on storytelling and exploration, often with puzzles to solve. Classic examples include the point-and-click adventure games of the '90s.
12. **Platform Games:** Require players to navigate a character through platforms and obstacles. Iconic platformers include Super Mario and Sonic the Hedgehog.
13. **Shooter Games:** Centered on combat and aiming. Shooter games can be first-person (e.g., Call of Duty) or third-person (e.g., Gears of War).
14. **Racing Games:** Revolve around racing vehicles, either on land, water, or in the air. Examples include Mario Kart and Need for Speed.
15. **Music and Rhythm Games:** Players interact with music by hitting specific cues in time with the beat. Games like Guitar Hero and Dance Dance Revolution are in this category.
16. **Party Games:** Designed for social gatherings and often encourage multiplayer participation. Games like charades, Pictionary, and Mario Party fit this category.
17. **Arcade Games:** Originally found in arcades, these games are often simple and designed for quick, high-score gameplay. Examples include Pac-Man and Space Invaders.
18. **Word Games:** Challenge players with language and vocabulary tasks. Popular word games include Scrabble, crossword puzzles, and Boggle.
19. **Boardless or Pen-and-Paper Games:** These are played with minimal or no equipment. They include games like 20 Questions, Hangman, and Tic-Tac-Toe.
20. **Party Role-Playing Games:** Games like Mafia and Werewolf involve social deduction, where players take on secret roles and work to achieve their objectives.

ONLINE GAMES

There are various types of online and offline games, each offering unique experiences and entertainment. Here's a broad overview of the different categories of games:

1. **Multiplayer Online Games (MOGs):** These games are played over the internet with other players from around the world. Examples include massively multiplayer online role-playing games (MMORPGs) like World of Warcraft, online shooters like Call of Duty, and multiplayer online battle arena (MOBA) games like League of Legends.
2. **Online Social Games:** Social games are typically casual games played on social networking platforms or mobile devices. They often involve interactions with friends and include games like FarmVille, Candy Crush Saga, and Words with Friends.
3. **E-Sports:** Competitive video gaming, where professional players and teams compete in various games. Popular e-sports titles include League of Legends, Dota 2, and Counter-Strike: Global Offensive.
4. **Browser Games:** These are games that can be played directly in web browsers, usually without the need to download or install anything. Examples include browser-based strategy games and idle games.
5. **Massively Multiplayer Online Games (MMOGs):** These games can support thousands of players simultaneously and are often virtual worlds where players can interact and create their own experiences. Second Life and EVE Online are examples of MMOGs.



ONLINE GAMES (2)

6. Online Card and Board Games: Digital versions of classic card and board games are available online. Examples include online poker, chess, and card games like Hearthstone.

7. Battle Royale Games: These are online multiplayer games where players compete in a last-person-standing battle. Popular examples include Fortnite, PlayerUnknown's Battlegrounds (PUBG), and Apex Legends.

8. Cooperative Online Games: These games require players to collaborate and work together to achieve objectives. Games like Among Us and Left 4 Dead fall into this category.

OFFLINE GAMES



1. **Tabletop Games:** Traditional board games and card games that are played in person. Examples include chess, Monopoly, Scrabble, and poker.
2. **Video Games:** Offline video games are those that are played on gaming consoles or personal computers without requiring an internet connection. This category includes single-player games, local multiplayer games, and games that can be played offline, such as The Legend of Zelda: Breath of the Wild, The Witcher 3, and Super Mario.
3. **Physical Sports:** Sports like soccer, basketball, and tennis are played offline, in physical environments, either casually or competitively.
4. **Role-Playing Games (RPGs):** These are games where players take on the roles of characters in a fictional world and embark on adventures. Offline RPGs include titles like The Elder Scrolls series, Final Fantasy, and Fallout.
5. **Card Games:** Traditional card games like poker, bridge, and solitaire can also be played offline with physical cards.
6. **Puzzle Games:** These games involve solving puzzles, challenges, and brain teasers, both in digital and physical forms. Examples include Sudoku, jigsaw puzzles, and mobile puzzle games like Monument Valley.
7. **Party Games:** These are games designed for social gatherings and typically involve a group of people playing together in person. Examples include charades, Pictionary, and board games like Apples to Apples.
8. **Educational Games:** Educational games can be played both online and offline and are designed to teach or reinforce specific knowledge or skills. Examples include math board games and language learning apps.

These categories encompass a wide range of games, catering to different interests and preferences, whether you enjoy playing online with a global community or prefer traditional offline gaming experiences.

TYPES OF INTERVENTIONS

Incorporating elements of games into the learning process can take various forms, and educators and instructional designers have developed several approaches to enhance engagement and learning outcomes. One of the most common approaches of incorporating gamification into education are:

1. **Game-Based Learning:** This approach involves using educational games as a core part of the learning experience. These games are designed with specific learning objectives in mind and are meant to teach content or skills directly. Examples include:
 - **Educational Video Games:** Interactive digital games designed to teach specific subjects, such as math, science, or history.
 - **Simulations:** Realistic, scenario-based simulations that mimic real-world situations and require learners to make decisions and solve problems.
 - **Board Games:** Analog games designed for educational purposes, like math board games or word puzzles.
2. **Gamified Learning:** Gamification involves adding game-like elements to non-game contexts to boost motivation and engagement. Some common gamification elements include:
 - **Points and Rewards:** Awarding points or virtual currency for completing tasks or achieving milestones. Learners can then use these points to unlock rewards or receive recognition.
 - **Badges and Achievements:** Issuing digital badges or achievements for completing specific challenges or demonstrating skills. These badges can serve as symbols of accomplishment.
 - **Leaderboards:** Creating leaderboards to showcase the performance of participants, fostering competition and motivation to reach the top of the rankings.
 - **Quests and Challenges:** Presenting learners with quests or challenges to complete, which can be related to coursework or extracurricular activities.

TYPES OF INTERVENTIONS (2)

3. Escape Room Learning: Inspired by escape room games, this approach involves setting up scenarios where learners must work together to solve puzzles and challenges related to the subject matter. It promotes teamwork, critical thinking, and problem-solving.

4. Role-Playing Games (RPGs): Using RPG elements, students take on roles and characters within a narrative. They make decisions, solve problems, and advance the story as they learn. RPGs can be used in language learning, history, and other subjects.

5. Digital Storytelling: Encouraging students to create and engage with interactive, digital stories. This approach combines narrative elements with gameplay and decision-making, making learning more immersive and creative.

6. Game-Based Assessments: Using game formats to evaluate students' knowledge and skills. This can include quiz-style games, educational trivia, or simulation-based assessments.

7. Augmented Reality (AR) and Virtual Reality (VR): Leveraging AR and VR technologies to create immersive educational experiences. Students can explore historical sites, conduct virtual experiments, or engage in immersive simulations.

8. Minecraft in Education: Using the popular game Minecraft as an educational tool, which can be adapted for subjects like geography, architecture, and problem-solving.

9. Serious Games: These are games designed specifically for educational, training, or professional development purposes. They are often used in fields like healthcare, military training, and corporate learning.

10. Competitions and Game-Style Challenges: Organizing contests or competitive activities that motivate students to apply their knowledge or skills to solve real-world problems.

Each of these approaches can be tailored to the specific educational context and subject matter, and the choice of approach should align with the learning objectives and the preferences of the learners.

Annex 5.
EdTech Terminology



mobilityeragame.com
test-designer.com



GLOSSARY

EDTECH

Collected with care by
Mobility Era Game and Test Designer team



EDTECH TERMS:

Here's a list of some important EdTech terms:

Blended Learning: A combination of traditional classroom instruction and online learning, often involving the use of digital tools and resources.

Learning Management System (LMS): A software platform for managing and delivering online courses and educational content.

MOOC (Massive Open Online Course): A large-scale online course designed for unlimited participation and open access via the internet.

Synchronous Learning: Learning that occurs in real-time, such as live online classes or webinars.

Asynchronous Learning: Learning that doesn't happen in real-time, allowing students to access content and complete assignments at their own pace.

Gamification: The use of game elements and principles in educational settings to engage and motivate learners.

Flipped Classroom: A teaching approach in which traditional in-class instruction is reversed, with students learning content outside of class and using class time for interactive activities.

Edutainment: The use of entertainment elements to make educational content more engaging and enjoyable.

Adaptive Learning: Personalized learning experiences that adapt to the individual needs and progress of each student.

Digital Literacy: The ability to use and understand digital technologies, including computer skills, internet use, and online safety.

AR (Augmented Reality) and VR (Virtual Reality): Technologies that provide immersive and interactive educational experiences through computer-generated environments.

AI (Artificial Intelligence) in Education: The use of AI to personalize learning, automate administrative tasks, and provide data-driven insights for educators.

Open Educational Resources (OER): Educational materials, such as textbooks and courses, that are freely available and can be shared and adapted by educators.

STEM (Science, Technology, Engineering, and Mathematics): An acronym representing key academic disciplines that EdTech often focuses on.



EDTECH TERMS (2):

Flipped Learning: A teaching method in which direct instruction is moved outside of the classroom, allowing for in-class activities and discussions.

Microlearning: Short, focused learning activities designed for quick consumption and retention.

Assessment Tools: Software or platforms used to evaluate student performance and progress.

Cloud-Based Learning: Storing and accessing educational content and tools in the cloud, allowing for remote access and collaboration.

Learning Analytics: The collection and analysis of data to inform and improve the learning process.

BYOD (Bring Your Own Device): A policy that allows students to use their personal devices for educational purposes.

Cognitive Load Theory: A psychological theory that explores how the human brain processes and manages information.

These are just a few of the key terms in the EdTech field. If you'd like more information on any specific term or have additional terms in mind, please don't hesitate to ask.

Annex 6.

Diploma of participation, Profile: Computer-based Assessment



Annex 7.

Diploma of participation, Profile: Game-based learning.

RESEARCHISTA
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Dutch Edtech

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FOR PARTICIPATION IN THE TECHNICAL TRAINING, AS PART OF THE EDUCATIONAL TECHNOLOGIES AND GAME-BASED EDUCATION RESEARCH PROJECT ADDRESSED TO MANAGERS OF EDUCATIONAL INSTITUTIONS. THE RESEARCH PROJECT IS FINANCED BY THE DIASPORA RELATIONS OFFICE (BRD) WITHIN THE DIASPORA PROFESSIONAL RETURN PROJECT, IN COLLABORATION WITH THE MINISTRY OF EDUCATION AND RESEARCH AND DUTCH EDTECH. TRAINERS: MRS. IRINA DE PAOLI, EDTECH PROJECT/ACCREDITATION COORDINATOR AND AUTHOR OF THE MOBILITY ERA GAME.

NOVEMBER 11, 2023 (DURATION: 4 HOURS).

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