# ASPECTS OF THE USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES AND THEIR IMPACT ON THE EDUCATION OF STUDENTS, FUTURE ENTREPRENEURS

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***Abstract***

*Digitalization in education due to current social challenges has become an essential factor of teacher-student interaction, allowing students to overcome certain territorial limits, social positions or community boundaries and opening new possibilities to learn, have fun, work, explore and achieve ambitious goals.*

*In universities digitization has become an important factor in educating students, future citizens adapted to the knowledge society, to achieve specific competences at global, European and national levels*

*The European model towards a digitized economy and society stands for solidarity, prosperity and sustainability, is based on empowering citizens and businesses, while ensuring the security and resilience of the European digital ecosystem and European supply chains.*

*The implementation of digitization enables the training of new skills for students, future entrepreneurs, enabling them to innovate, set up and develop their own business wherever they live, to open markets and make investments anywhere in Europe and anywhere in the world, and to create new jobs at a time when an increasing number of Europeans feel threatened by economic security or the environment.*

*The introduction of new information technologies into the educational environment has brought about many changes in the infrastructure needed in schools, and ICT-specific training courses have been directly linked to improving the quality of learning and digital literacy.*

***Key words:*** *students, digitalization, education, eLearning, ICT tools*

## INTRODUCTION

The personalisation of the teaching-learning-assessment process, aimed at offering students an approach as close as possible to their interests and educational profile, has allowed the successful integration of new information and communication technologies into the current teaching activity, using parallel sources to capture their attention, motivate students to seek out the necessary information and to acquire the knowledge they need to cope with assessments. The use of alternative sources of information, whether material or digital, which offer quite different presentations, can often create confusion among young people, but the role of the teacher is to guide and guide

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the student to the best possible understanding of the issue in question [1]. This is why we should give due importance to the teacher, who is challenged and obliged to make a correct management of the cognitive resources existing in the group/groups of students and to make an informed choice to use appropriate teaching aids [2,3].

## MATERIAL AND METHOD

*The research methodology used to achieve the above-mentioned objectives includes qualitative methods: meta-analysis of the literature and quantitative methods (comparative analysis and correspondence analysis) as well as observations and logical inferences on the impact of digitisation policies.*

## RESULTS AND DISCUSSIONS

The field of education is undergoing radical changes aimed at reorganising the existing infrastructure of future learning environments. Information and communication technology-ICT is a high source of expenditure for many educational institutions, but spending money more effectively on the right equipment and infrastructure can ensure that students are engaged and motivated in their learning and reach their potential. In recent years, ICT skills have become essential in the teaching-learning process with the development of technology and the emergence of eLearning products. ICT is a multi-purpose technological framework. Particularly for the field of education, it can facilitate the management of communication, creation and information across all components: PCs (personal computers), Internet, broadcasting and telephony technologies [4]. The benefits translate into improved efficiency and effectiveness of education at all levels, in both formal and informal settings.

ICT tools that support learning are the most representative for supporting development towards graduation and lifelong learning, and for facilitating digital inclusion. Such an approach is perfectly in sync with the economic development strategy based on smart specialisation which implies an approach to economic development and innovation in line with the specificity of the area and the competitive advantage that could be developed [5].

Based on the priorities set by the European Commission and adopted by Romania, the interventions to be implemented with regard to ICT education can be organised in 3 categories, according to the specificity of the learning process:

*Education through ICT-based curricular activity*

This type of education is mainly based on OER (Open Educational Resources) and Web 2.0 resources on project-based learning and assessment and e-Portfolio of student or learner outcomes and the creation of original digital content and interactions. At national level, a similar exercise has been implemented to develop the level of ICT in education in disadvantaged communities in Romania, identified and monitored under the Knowledge-Based Economy programme. Other models of good practice successfully developed and implemented in Romania: POSDRU project "Key ICT competences in the school curriculum", INSAM project (Digital tools for improving the quality of assessment in pre-university education) "Restructuring the school curriculum in secondary education".

*Education through ICT-based extra-curricular activity*

The resources used in this project are ICT technologies to support extra-curricular activities (creative camps, exchanges, international study visits and the e-Vacation project).

*Lifelong-Learning with the help of ICT*

The objective of continuing vocational training is for adults to acquire the knowledge and skills needed on a voluntary



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basis throughout their lives for personal or professional benefit. Special attention must therefore be paid to the formation of a policy in this area, based on a national consensus achieved through social dialogue. Analysis of the results of the PESI (Programme for International Student Assessment) in the national context highlights the need to improve teaching methods as well as the curriculum, especially with regard to the development of specific skills such as interpreting, applying and reflecting on information in different contexts. According to PESI 2009, in Romania students from urban schools (with populations between 100 000 and 1 million) perform on average almost one level higher than rural students. According to Eurostat data for 2010, only 1.6% of Romanian adults (25-64 years) continue to participate in education and training, with slightly higher participation among women, compared to 26% in Ireland, 32% in Denmark, 11% in the Czech Republic and 4.5% in Poland. Moreover, Romania still has a lot of catching up to do compared to the EU average of 8.9% and the Eurozone average of 8.2%. Regarding the implementation of eLearning solutions in universities, in 2010, more than half of the universities (58%) had eLearning solutions in place and in the following years another 9 universities implemented such platforms through POSCCE and POSDRU funding.

**Strategic Development Lines**

| Strategic Development Lines | Lines of action | Description |
|---|---|---|
| **ED1. Provision of ICT infrastructure infrastructure in schools.** | Provision of equipment and infrastructure in schools. (Operational) | Providing schools with ICT equipment and systems will mainly affect the digital literacy of pupils, which will indirectly influence the quality of future human resources.<br>If the investment plan focuses on creating a balance between urban and rural areas, the quality of education will improve in the long term and the digital divide will be reduced, leading to the social inclusion of disadvantaged areas. The existence of an ICT network in each school will also allow better management of educational materials and facilitate pupils' access to education. In addition, the implementation of ICT infrastructure, complemented by the installation of educational software (for teaching, testing) will encourage ICT-assisted teaching and require objective assessment of student performance.<br>Coordinator: Ministry of Education |
| **ED2. Developing digital competences of pupils and teachers.** | Training for teachers in the use of ICT (Facilitation) | Due to the rapid pace of development and improvement of ICT systems and technologies, to ensure appropriate education of students, teachers themselves need to be regularly trained on the latest developments in the ICT-supported education sector.<br>Coordinator: Ministry of Education |
| | Provide specific ICT training courses directly linked to improving the quality of learning and digital skills. | By thoroughly training teachers, pupils and students will gain a competitive advantage that will be useful when they want to work.<br>Coordinator: Ministry of Education |



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| | | |
|---|---|---|
| **ED3. The use of ICT (OER and Web 2.0) in the learning process and in the Learning by Ear process. Lifelong Learning.** | Implementing the use of OER by:<br>- providing an optimal framework for<br>use of Open Educational Resources (OER)<br>- digitising and archiving educational content.<br>(Strategic) | Current technology opportunities provide access to resources such as Open Education Resources. Such resources can be used without a licence and include educational content such as: lessons for all curriculum subjects, educational assessment and thematic research. OER involves both content<br>source digital content and an opportunity to developing interaction<br>interaction between students through<br>creating, storing and distributing content original content generated by them using OER.<br>Coordinator: Ministry for Society<br>Information Society |
| | Inclusion Web platforms 2.0 in the processes teaching-learning processes.<br>(Facilitation) | In view of a flexible learning process, a key EU objective is to implementation of ICT technologies such as Web 2.0 across all Member States.<br>This activity requires a flexible education within in which ICT skills<br>Constitute skills.<br>Web 2.0 platforms are in currently used for professional development, but<br>and for improving classroom training.<br>By using Web 2.0 tools, students can prepare both curriculum projects cross-curricular projects and extra-curricular projects for the development of social skills and entrepreneurial skills.<br>Online platforms for social networking sites can be used for documentation with on concepts innovative concepts such as the 'room of mirror classroom" or sharing the latest Web 2.0 applications in schools.<br>Coordinator: Ministry for Society Information Society |
| | Stimulating students to be more involved in the process learning.<br>(Operational) | Due to the degree of novelty represented by the technological, students will be stimulated to become more involved in the process of learning which, over time, will have a positive impact on their performance, with the potential to reduce drop-out rates dropout. Visual materials interactive visuals and additional information provided by the Internet will increase student engagement.<br>The use of ICT will also allow the adaptation of the subjects taught according to pupils' abilities, supporting personalised and individualised learning.<br>Coordinator: Ministry of Education |
| **ED4. Continuous training of ICT skills skills of administrative staff public administration** | Encouraging Lifelong Learning.<br>(Facilitation) | With regard to lifelong learning, online education platforms and existing materials in digital format will encourage distance learning, allowing adults of any age to acquire knowledge in a particular field at any time of their lives.<br>Coordinator: Ministry of Education |



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**SWOT analysis for the ICT in education sector**

| Strengths | Weaknesses |
|---|---|
| Accelerating the use of the Internet in All areas of the country.<br>Equipping the system with computers system as a result of government programmes.<br>Majority of students in urban areas have a satisfactory level of literacy digital literacy.<br>More than 70% of universities have implemented e-learning platforms.<br>Good ICT skills of students and improving access to technology, regardless of services provided by universities.<br>Equipping libraries and training digital skills training in rural areas.<br>Since 2005, ICT has been a compulsory subject for all streams, profiles and vocational specialisations/qualifications (in secondary and vocational education).<br>Since 2009, digital skills are assessed and certified for all secondary school graduates through a compulsory examination as part of the baccalaureate exam.<br>ICT is planned to be introduced as a compulsory subject (secondary school) and an optional subject (primary school) under the National Education Law 1/2011.<br>Teachers trained in the use of ICT tools in the teaching-learning-assessment process (through training courses on POCU projects). | Decreasing teacher population in the pre-university education system.<br>Low level of learning skills, including digital skills, compared to the European average.<br>The use of e-learning tools is hampered by the insufficient number of platforms (at national level) and constrained by low flexibility in generating and using content.<br>Low number of e-learning projects dedicated to adults.<br>Lack of a coherent approach to lifelong learning in adult life.<br>Insufficient materials in digital format (books, theses, articles, journals, etc.).<br>Pedagogical and methodological preparation of teachers on the integration of ICT in the learning process through initial training is modest. |
| **Opportunities** | **Threats or coercion** |
| National and international funding programmes in the field of education, ITC use, research, development and culture.<br>Development of Internet access infrastructure in Romania.<br>Use of OER and WEB 2.0 technologies for educational purposes, which can provide flexibility to the educational process.<br>Intensify trans-national collaborations between universities. | Lack of collaboration between the private sector and educational institutions.<br>Lack of correlation between the e-learning initiatives included in the Competitiveness (POC) and Human Resources Development (POSDRU) Operational Programmes, the current POCU - Human Capital Operational Programme.<br>Lack of transparency and coherence for initial and continuous training of educational staff.<br>Difficulty of including rural areas<br>in skills development. |

În baza rezultatelor analizei SWOT putem utiliza oportunitățile identificate:

- Based on the results of the SWOT analysis we can use the identified opportunities:
- Development of flexible OER and WEB 2.0 technologies and their use for educational purposes;
- Promoting the development of digital competences at EU level among all inhabitants of a country: pupils, students, adults in lifelong learning, socially excluded people (with disabilities, below the poverty line, in disadvantaged rural areas, etc.);



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- Support the uniform and comprehensive development of digital infrastructure to ensure free Internet access for all inhabitants of the country and to support uniform Internet use among all groups of inhabitants and all geographical regions.
- The opportunities identified for ICT in education will be used in part to propose a series of measures to address weaknesses in this area, such as:
- Further support the development of ICT infrastructure in pre-university education;
- Improving the level of digital competences in Romania by organising training sessions in schools and beyond;
- Additional and direct support for the development of digital competences for young people in areas of high social exclusion (e.g. rural areas, areas below the poverty line);
- Preparing and promoting the use of OER and Web 2.0 tools for lifelong learning (LLL) among adults.

## CONCLUSIONS

1. Digital skills, which are absolutely necessary for any teacher at the present time, are understood by teachers as being useful because they allow them to connect to everything that the virtual world entails, including the latest developments in the field of teaching, but, moreover, they facilitate the path towards authentic communication with their students, who demonstrate a thorough knowledge of all virtual media.

2. In this way, an intergenerational link is created between two types of social actors, with new information and communication technologies as a communication channel and the exchange of information as a goal, aimed at both transmitting new information and synthesising information that has already been acquired but needs to be fixed in order to be validated and assimilated.

3. Authentic teaching, in which there are normal and natural exchanges and feedback between teacher and student, in which connections are made between notions and emphasis is placed on the formation of both transversal and transferable skills, requires a high level of interaction and makes use of all interactive teaching tools, involving above all media tools, whether we are talking about the computer connected to the Internet and the video projector, the CD-rom and CD-audio, listed as being used by most teachers, or digital programmes and tools such as Google-Maker, Office, PowerPoint, etc.

4. The tools of modern technology have the role of pigmenting the whole teaching process, giving it a contemporary twist and inserting it into the everyday texture of a young person's everyday activities.

5. The familiarity with which they are viewed by young people means that multimedia tools succeed in bringing their teachers closer to young people and introducing them into their natural operating space, which is the virtual space.

6. In order for this teaching-learning-assessment process to achieve its intended purpose, the teacher is required to manage the group of students he or she is managing correctly by making appropriate choices regarding the teaching methods and resources used.

## REFERENCES

1.Toqeer Ahmad, Arslan Sheikh,2021, Impact of information and communication technologies (ICT) on student's learning: a case from university of the Punjab, Pakistan**,** Digital Library Perspectives ahead-of-print(ahead-of-print), 2021, DOI:10.1108/DLP-03-2021-0027
2. Bibi, H. J., Ayub, A., & Ismail, I.,2023 Impact of ICT on the Progress and Productivity of Students at the University Level. Journal of Social Sciences Review, 3(1), 270-282, 2023, https://doi.org/10.54183/jssr.v3i1.155



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3. Shahzadi Humbhi, Shabbir Tareen, Abdul Raheem, 2022 The Impact of ICT on Students' Educational Performances: an Overview of Higher Educational Institutions of the Far Flung Areas of Pakistan. International Journal of Sustainability Management and Information Technologies, Vol. 8, No. 1, 2022, pp. 19-28. doi: 10.11648/j.ijsmit.20220801.13
4. *** COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS, Mid-term review of the implementation of the Digital Single Market Strategy, A connected digital single market for all, 2017 2017, http://eur-lex.europa.eu/legal-content/RO/TXT/HTML/?uri=CELEX:52017DC0228&from=EN;
5. *** DIRECTIVE (EU) 2016/1148 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 6 July 2016 on measures for a high common level of network and information security across the Union, Official Journal of the European Union: http://eur-lex.europa.eu/legal-content/RO/TXT/PDF/?uri=CELEX:32016L1148& from=EN;



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