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## Article

# Teachers' and professors' perception of telework in Romania

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## TEACHERS' AND PROFESSORS' PERCEPTION OF TELEWORK IN ROMANIA

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### Abstract

The first mentions of working from home date from 1979, the appearance of the Internet leading to an increase in the number of companies that have applied this system. Remote work, work from home, telecommuting, as well as teleworking are concepts that describe an alternative activity of performing traditional work. With the onset of the Coronavirus pandemic, the shift in a higher or lower proportion of companies' online activities, depending on the economic sector in which they operate, has become inevitable and sudden, with telework becoming the new normality among employees and employers. The objective of this study is to find out to what extent teachers in Romania agree to carry out teaching activities in the telework system and whether the educational environment (pre-university or univeristar), the degree of effort put in and the degree of fatigue felt in the telework system influence the extent to which teachers agree to carry out teaching activities in this type of system. The data was collected through a questionnaire-based exploratory research on a sample of 208 higher education professors and pre-university teachers. Non-parametric statistical methods of data analysis were used to measure the perception of study participants in the telework system and statistical methods suitable for qualitative data analysis were used for the assumptions: ordinal regression, Mann-Whitney U Test and Kruskal-Wallis Test. Research results show that teachers make an additional effort to carry out telework system activities compared to the teaching activity period in schools/campus to the majority of respondents (87.5%), leading to a much higher feeling of fatigue (73.5%), and as the main impediment to online teaching, the evaluation of the progress of pupils/students. The study can support the management of Romanian education, at micro and macro level, in the correct substantiation of decisions on the sizing and evaluation of teaching activities and related processes that teachers carry out in telework conditions.

**Keywords:** telework, teachers, online education, nonparametric statistical analysis

**JEL Classification:** I21, I23, J24, J81

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## Introduction

Working from home is not a new phenomenon, the first mentions appearing in 1979, once the energy crisis. In the same year, after the publication in the Washington Post of the article *Working at home can save Gasoline* (Pratt, 1984), IBM allowed five employees to work from home, a number that increased until 1983 to 2,000 employees (Toptal Research, n.d.). The emergence of the Internet in 1983 led both to an increase in the number of companies that allowed employees to work from home at least one day a week, and to the number of employees who adopted this measure. Working from home, seen as a way to make the activity more flexible, has become preferred by employers, but especially by employees, due to its advantages (flexible schedule, more time spent with family, the possibility to work from another city, etc.), making that, until 2019, approx. 50% of employees globally work at least 2.5 days/week outside their offices (International Workplace Group, 2019).

With the onset of the Coronavirus pandemic, telework almost became widespread, but for other reasons: preventing the spread of the virus, the lack of large spaces to ensure social distancing and, ultimately, the lockdown of activities. Thus, telework has become the new normality among employees, but also among employers, who have become dependent on information technology. Due to globalization, the pandemic has had an unprecedented global impact, both economically, mentally and emotionally:

- rising unemployment, declining consumption and teleworking have accelerated the negative effects of the digital economy (Xiarewana and Civelek, 2020);
- the sociability of the human being was strengthened and highlighted, the social isolation caused by COVID-19 negatively affecting not only job satisfaction but also the level of stress, mainly due to lack of interaction between colleagues (Toscano and Zappala, 2020);
- decision makers were forced to carefully analyze the effects of telework on the company's performance. However, in pandemic conditions, the employee's health must take precedence, despite the effects/difficulties that telework can induce in organizations: misinterpretation of messages, monitoring difficulties, different involvement in the activity, freedom in organizing the activity, openness to cyber attacks etc.

While the pandemic continues with the emergence of new virus mutations, its impact on the labor market is significant and still undetermined, affecting most employees and leading to polarization: areas where teleworking is not possible and areas where it is possible apply, more or less effectively. The activities that can be carried out in telework regime are characterized by the concentration of information or the intensity of knowledge, key attributes that are amplified by information technology: the ability to be coded; the ability to be standardized and the modular character (Neirotti, Paolucci and Ragueseo, 2012). The impossibility of working through telework in the case of some of the employees had serious, direct and associated consequences, of uncertain duration, such as: reduction of working hours, reduction of salaries, dismissals and job losses, closure of businesses, decrease in quality of life, as well as declining living standards. In parallel, for a significant segment of the active population, the transition to the telework system or short-term work has led to a sharp increase in workload, as well as major changes in living and working conditions. According to Ellder (2019), teaching activity can be more easily transferred to the telework system compared to other fields of activity.

This paper presents the following structure: the study of the literature on the concepts of telework and remote work, the presentation of concrete data on the situation of online education, the methodology of research, results and discussions, conclusions, and bibliography.

### 1. Literature review: Defining the concepts of telework and remote work

Analyzing a series of contemporary phenomena of pressure on the centralized urban structure, as well as the development of communication systems and technologies, Nilles (1975) introduces the concept of *telework*. In the literature there are numerous studies on telework and flexible work schedule, which analyze, in extenso, *the causes* (strategy to reduce pollution, traffic, energy consumption, etc.) (Melo and de Abreu e Silva, 2017), *the effects on organizations, employees* (high level of involvement, job satisfaction and well-being, but also work intensifications, increasing inability to disconnect) (Santana and Cobo, 2020) and *new product development projects* (Coenen and Kok, 2014), but also *future forms of work* (Santana and Cobo, 2020). The found definitions have common elements: carrying out the activity in a place other than the employer's premises/buildings, use of information technology, but also distinctive: determining a period of time in which you can work in telework and detailing the resources needed to carry out the activity.

"Remote work, at home, teleswitching and telework are a few terms found in literature that describe an alternative activity of the provision of traditional work alternative to work performed at work, which involves carrying out work in a place other than in the buildings of a firm and in which employees interact with colleagues only through electronic communication." (Gupta, Karimi and Somers, 1995 cited in Santana and Cobo, 2020; Melo and de Abreu e Silva, 2017). In parallel with the development of technology, in teleworking a diversification can be identified, namely mobile telework, which involves the use of information and mobile communication technologies (ICT), such as smartphones, tablets and laptops, which creates greater employee mobility.

In the current pandemic context, even though telework was usually done for limited periods of time (one or two days a week or month), unlike working from home, many employees were advised to have a full-time telework time in order to prevent the spread of coronavirus. For many companies, teleworking has been something new and with this innovation both advantages and disadvantages have begun to be perceived, even if there is no unanimous agreement on them and, paradoxically, the advantages identified by some authors are considered to be unfounded or even disadvantages, in the opinion of others.

**Increasing labor productivity.** Despite the fact that many employers are concerned about the potential reduction in productivity, for a considerable number of teleworkers has proven to be much more productive and efficient, by organizing work in a familiar environment, without the inherent disruptions of working in a common space with other colleagues, within a autonomously established program, of time management in a flexible way (Gajendran and Harrison, 2007), with increased motivation and satisfaction of work. In the opinion of Neirotti, Paolucci and Raguseo (2012), although the relationship between telework and productivity is obvious, telework itself may not have a direct effect on productivity, for at least two reasons: higher productivity may be the consequence of a more skilled human capital and not telework, and the benefits on productivity can be the effect of adopting new work practices and investing in information systems and ICT infrastructures that allow for

organizational and process innovation. In our opinion, the increase in labor productivity, seen as results obtained through telework, is difficult to quantify, as long as it does not relate, according to economic theory, to a well-defined time frame and which, in the case of telework is almost always prolonged. For many employees, disconnection from the computer system almost never takes place at the end of their normal working period, either because of ongoing teleconferences that are not left out even if the work program is over, or because of the same virtual meetings, that take up much of the day after employees actually start working until they complete their daily, current tasks. The situation was also discussed at EU level, where it is intended to legislate the legal right of employees to disconnect from all electronic communication systems outside the working hours, without consequences, in order to draw a line between professional and personal life. “*The right to disconnect*” already exists in some European countries, while in others it is of no importance (Llave and Weber, 2020).

**Reducing employer costs.** Although not applicable to all hierarchical positions, many employees working from home have to pay for their own work equipment, to bear the cost of electricity and supplies, all of which are turning into business savings. However, some employee costs are also subject to reductions, such as those involved in appropriate clothes at work, transport to work/jobs and back to home (Gajendran and Harrison, 2007). Other costs which are decreasing at the level of employers can be those resulting from the reduction/elimination of internal and external travel (car and air transport), the reduction or elimination of costs of renting office space, the reduction of real estate investments, the cost of internet connection, thermal energy, water, security, etc. To date, no macroeconomic impact assessments have been identified that take into account all the positive and negative financial, cascading changes and consequences generated by teleworking at the level of the employer and the employee.

**Hiring the most talented and devoted people and reducing absenteeism.** Remote online recruitment offers employers the opportunity to choose the best employees, no longer necessary for them to live in the employer's country. With the help of computers and an internet connection, regardless of the country or continent they are on, employees can participate in a job interview and then work in the company. Workplace absenteeism and delays in work are problems for both employees and employers, which are eliminated in the case of telework. In general, employees avoid jobs for which they are forced to travel long distances and are inclined to translate time savings into the start of the telework day earlier and/or the completion of work tasks beyond the working hours (Coenen and Kok, 2014; Santana and Cobo, 2020). Telework is a work system generating social inclusion, but also social exclusion, being more expensive and difficult for economically disadvantaged employees because it involves: internet access, IT equipment, knowledge of using the Internet, knowledge of an international language (Kanellopoulos, 2011).

**Environmental benefits.** Work from home and full-time telework have the effect of increasing air quality, reducing environmental pollution and also protecting it, by limiting or eliminating a series of activities: traveling every day by car to and from the office (reducing fuel consumption, reduction of carbon dioxide and monoxide emissions, greenhouse gases) (Irwin, 2004); travel to other cities or countries in the interest of work; documents/reports/analyses, which were normally printed, are sent electronically, which leads to a reduction in paper consumption and a reduction in deforestation, etc. Other authors believe that teleworking can have unexpected effects: the car can be used more widely by another family member, you can work outside the city (from holiday homes), which involves longer

distances and cancels the benefits expected (Rietveld, 2011); may induce urban sprawl, with negative effects on land use (Melo and Abreu e Silva, 2017); energy consumption (lighting, heating, cooling, equipment operation) drastically decreased in office buildings was transferred to the employee's workplace, there are no studies to measure them (Irwin, 2004).

If there is more or less consensus on the benefits of telework in the literature, the negative psychological effects are less disputed in the context of the pandemic: telework can be a viable solution to protect the lives and health of employees and others, but the effects social and psychological can blur it: social isolation, impossibility of integration into a work team, family conflicts (Gajendran and Harrison, 2007), depression, etc.

Another negative effect of telework is the increased risk of cyber attacks. Employees who do not have high-performance personal computers and use poorly protected internet networks can become safe targets for phishing attacks, cyber espionage and social engineering. A particular increase in cyber attacks was reported in 2020, with the mention that the target of cyber crime was no longer the target of individuals and small businesses, but of large corporations, governments and critical infrastructure, with the aim of stealing data, causing disruptions and, of course, making a profit.

It is clear that teleworking can bring both advantages and disadvantages, some common, others particular, depending on the scope, which can be taken into account given that telework is a voluntary act, and not a system of compulsory labor, imposed by an epidemiological situation.

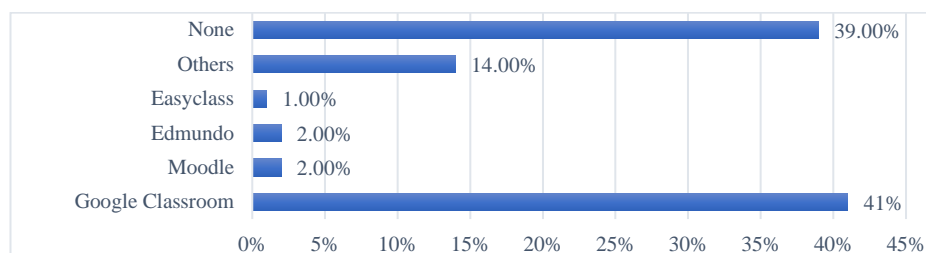
## 2. Online education during the pandemic period

Education is the basis of the economic and social development of a nation, through education providing knowledge and skills to members of society and, above all, cultivating the personality of the youngest members of society, by developing their individual ability to manage quality of life and, ultimately, success in life (Idris et al., 2012). The idea is not new, one of the main themes of the great Eastern and European philosophers of antiquity: Confucius considered that education and self-culture can overcome individual disputes and gain self-discipline, regardless of social class, on education as a means of transformation, discovery of human nature and character-growing (Me-Ching NG, 2009); Socrates claimed that the virtue is knowledge (humiliation, patience and a strong desire to learn) (Gill and Pellegrin, 2006); Platon spoke of the power of education to shape characters, leading it to support the organization of education by the state from pre-school age and to establish the Academy as a higher education institution (Stan, 2019).

The end of the second decade of the third millennium came with a major change, transformed into a global challenge, the COVID-19 pandemic, one of the most affected areas being education, meaning that the classical teaching system - the classroom, has been transferred to the online system, and the classic teaching-learning methods have been replaced or supplemented by new and interactive methods. Thus, online courses, through the multiple communication channels available on the internet, have replaced physical courses, virtual classes have replaced physical classes and, finally, classical learning has been replaced by online learning. Each professor and teacher was faced with a new reality, in which he was forced, overnight, to transform the content of the discipline to be taught into a digital one, to which all pupils and students had access, to explain and, practically, to adopt and adapt to a

new system - telework. However, the online teaching activity should not be reduced to a simple formality of reproducing, in a different way, some lessons/courses and subjects that had been planned to be covered under normal conditions. The new circumstances of online teaching, in the telework system, must be transformed into a chance to rethink traditional teaching and learning methods, to share the appropriate professional skills, but also to develop digital skills, indispensable for the future. Along with the teachers, the teaching-auxiliary staff was put in the situation, as in a very short time, to carry out and manage the support processes of the teaching activity in the telework system, in order to ensure continuity in the functioning of school organizations/universities, which involved adapting to the new situation, including by participating in a series of tutorials to ensure their required digital skills. The new social reality has outlined the urgent need to digitize the entire education system (pre-university and higher education), in conditions of massive investments for creating and/or updating and securing online platforms of schools and universities, in order to evolve education in Romania to *Education 4.0*.

The insufficient level of digitalization of Romanian education is also supported by the conclusions of a study conducted by the University of Bucharest, between March 15-31, 2020, on a sample of 6,000 pupils, students, professors and teachers, which shows that the most used platform was Google Classroom - 41%, 39% of respondents stating that they did not use any of the platforms dedicated to online education, which raises serious questions about the educational act in the first two weeks after declaring a state of emergency in Romania, when teaching activity was suspended (figure no. 1).



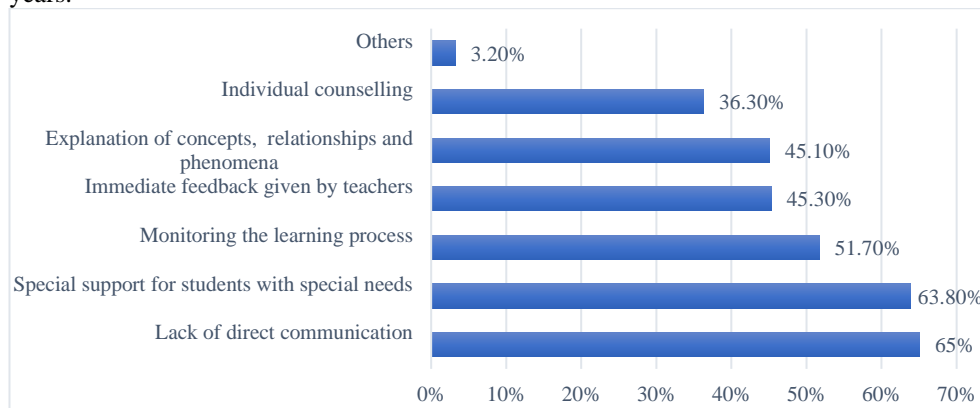
**Figure no. 1. The main online platforms used to support teaching in Romania between 15-31 March 2020**

Source: Statista, 2020a

The same study also highlighted the main impediments and limitations of online teaching, namely: lack of direct communication between pupils/students and teachers, lack of help and attention received by students with special needs if they were present in class, monitoring deficient learning process of students and lack of direct and immediate feedback from teachers and difficulties in explaining concepts and phenomena, the tools present in schools are missing on online platforms (figure no. 2).

Also in the sphere of the main impediments encountered in carrying out the online learning activity is cyber bullying – “aggressive act or behavior, carried out over time, repeatedly, through electronic means, by a group or a person against a victim. which cannot be defended” (Smith et al., 2008, p.376, cited in Myers and Cowie, 2017), which implies an imbalance of power, real or perceived. Even if the suspension of courses in the classical system limits some traditional forms of aggression, cyber aggression can be accentuated

during online education, a topic widely treated in the scientific literature for more than 10 years.



**Figure no. 2. The main existing impediments in conducting online classes in Romania in 2020**

Source: Statista, 2020b

In online education, pupils now have more freedom, which can be used to intimidate their peers without being aware of the psychological impact of their actions (Englander and Moldowney, 2007), making it almost impossible for a teacher to know if and when this happens. Moreover, 21<sup>st</sup> century youth are almost natively digital (Myers and Cowie, 2017), in contrast to many teachers, who are forced to adapt to virtual platforms and cannot recognize aggression when it takes place during online courses, being overwhelmed by the need for training in this field.

If higher education has adapted relatively quickly to the change imposed between the two teaching systems (from campus education to online education), the same cannot be said about pre-university education, affecting teachers and pupils alike. Florian and Țoc (2020) claim that it is not even possible to assess the degree to which teachers in Romanian pre-university education have adapted to new online teaching methods, as their digital skills cannot be assessed due to the lack of training and advanced training courses in this field.

But, the biggest challenge in the pre-university education system is the access of pupils' to online education (and, in some cases, teachers), both for economic reasons (lack of any equipment - laptop, computer, tablet, smartphone and an internet connection), as well as due to the lack of internet coverage in certain areas of the country - table no. 1.

During the analyzed period, although there is an upward trend of internet access for both urban and rural households, the difference between the two environments is considerable, reaching over 20 percentage points, except for the last two years. The situation is also confirmed by a survey conducted by Romanian Institute for Evaluation and Strategy, between April 27-30, 2020, which shows that 32% of pre-university students did not have access to online courses due to lack of a suitable device (laptop, tablet, smartphone), and 12% of students did not have a strong enough internet connection for online courses, many students coming from families where the risk of poverty and social exclusion is high, risking dropping out of school (Florian and Țoc, 2020).



Table no. 1. Household access to the Internet depending on the environment of origin

Year	Share of households with internet access (%)	
	Rural	Urban
2015	46.6	71.9
2016	52.3	74.5
2017	56.9	77.5
2018	61.5	81.0
2019	66.7	82.5
2020	69.7	84.8

Source: National Institute of Statistics, 2021

Although the coronavirus crisis could not be predicted, some European countries have invested heavily in the digital infrastructure of education systems. During the pandemic, in order to support teachers and maintain the interest of pupils and students, the European Commission proposed the use of several resources, such as online learning platforms, including: School Education Gateway, eTwinning, Salto-Youth, etc. According to a study conducted in the U.S.A. on the frequency of searching and using online resources, it was found that the intensity of searching and using online learning resources has increased following the pandemic, with two types of online resources, namely: *school-centered online resources* and resources that the school uses to keep in touch with students, to distribute homework and directions (sought and used, especially at the beginning of the school year, but declining during the school year) and *resources focused on parents and students*, respectively additional online learning resources, on which are accessed by both students and parents (sought after and used constantly throughout a school year) (Bacher-Hicks, Goodman and Mulhern, 2020).

The online teaching activity can be included in the telework system, as it can be done from any place where there is a proper internet connection. Also, online teaching takes place during the epidemiological incidence, so it is not permanent and is done with the help of information and communication technology. It should be noted that teachers have the opportunity to choose from where they work online, such as the example of teachers at a university in Finland who prefer to work in a telework system at home, from a private place, such as be a cottage, or while traveling, and activities in the telework system include preparing courses and lectures, reviewing and correcting materials received from students (Parkkola, 2003).

It is obvious that any change, whatever its nature, brings both advantages and disadvantages. For teachers, the benefits of online teaching include: a more flexible personal schedule, greater peace and concentration, independence from work, motivation and pleasure to work, increased productivity and quality of work, strengthening family relationships, eliminating travel to work as well as personal development (Parkkola, 2003). In the category of disadvantages, identified by the same author, we can mention: decreased visibility at work, decreased or eliminated support services in carrying out activities, interrupted flow of information, reduced teamwork, weakened relationships with colleagues, lack of feedback, but also affecting work status and self-esteem. We note that most of the benefits and disadvantages of teleworking for teachers are social, with reference to oneself, family or colleagues and will certainly bring about various changes, whether it is the teaching activity itself, whether it is a state of mind that can be induced by effort and fatigue. Starting from the objective of the present study and from the literature review, the following hypotheses were drawn:

- Hypothesis 1: The educational environment, higher education or pre-university systems, influences the extent to which teachers/professors agree to carry out teaching activities in the telework system.
- Hypothesis 2: The educational environment, the degree of effort put in, and the degree of fatigue felt during this period influence the extent to which teachers agree to carry out teaching activities in the telework system.
- Hypothesis 3: There are significant differences between teachers, differences generated by age and experience (seniority in work) in terms of assessing student progress.
- Hypothesis 4: Telework stimulates the application of interactive learning methods.

### 3. Research methodology

In addition to the influence of the educational environment, the degree of effort and the degree of fatigue felt on the extent to which teachers agree to carry out teaching activities in the telework system was taken into account and the premise that assessing student progress and applying new and interactive teaching methods could be additional sources of effort and fatigue, especially in the context of two variables, namely age and teaching experience (seniority in work). Given the objective of the study, the following are detailed elements related to the research method, participants and variables studied.

**Method:** the research is exploratory, the data being collected through a *self-administered questionnaire*, on the online platform [www.isondaje.ro](http://www.isondaje.ro), between December 2020 and February 2021. The questionnaire included 15 questions, of several types: dichotomous, (polytomous or multiple choice item/question, closed, demographic (gender, age and seniority), perception and content. For the analysis of the hypotheses we used statistical methods adequate to the qualitative data: ordinal regression, Mann-Whitney U Test and Kruskal-Wallis Test.

**Participants:** 208 higher education professors and pre-university teachers (42 pre-university teachers and 166 higher education professors; 148 women and 60 men); the data used in the analysis obtained from the statistical survey excludes the responses of those who declared that they did not work in the teleworking system during the pandemic period.

**Measurements:** in order to measure the degree to which the participants in the study agree with telework or rather, the development of teaching activities in the telework *system*, we used nonparametric statistical methods of data analysis, because the questions of the questionnaire generate answers that can be classified on a nominal and ordinal scale. A reliable way to measure respondents' opinion can be achieved through closed-ended questions, using the Likert forced-choice scale, most of which have an even number of answers. The elimination of the neutral answer obliges the respondents to opt for an answer in which to express their degree of agreement or disagreement with a statement. The variables analyzed in the study are presented below (table no. 2).

Table no. 2. Classification of the studied variables

Variable's name	Variable's type	Variable's label
Origin of respondents - Educational background (pre-university or university environment)	Independent	Item1
Agreeing to carry out teaching activities in a telework system	Dependent	Item3
Application of various ranges of teaching tools and methods	Dependent	Item 4_2
Assessing students' progress as an impediment	Dependent	Item 5_6
The degree of effort made/felt in carrying out teaching activities in the telework system, compared to the period of teaching activity in school/campus	Independent	Item9
The degree of fatigue felt when carrying out teaching activities in the telework system, compared to the period of teaching activity in school/campus	Independent	Item10
Respondents' gender	Independent	Item 13
Respondents' age	Independent	Item 14
Respondents' experience (seniority in work)	Independent	Item 15

#### 4. Results and discussions

The survey results showed that of the 208 professors from university and pre-university backgrounds, 73.5% worked in a telework system at the request of the employer, and of these, only 27.5% said that they enjoyed to work in this type of system. With regard to the advantages conferred by telework, teachers agreed with the following: reducing the time allocated to transport to the workplace (77.2%), the wide range of teaching tools and methods (60.6%), working in a familiar environment (56%), and last but not least, spending a longer time with their families (59.2%).

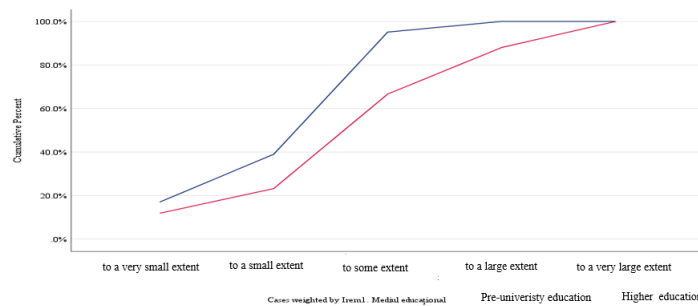
According to the respondents, the main impediments encountered in online teaching were: higher workload (87.1%), stress (73.5%), lack of interaction with students (85.7%), assessment of student progress (58.7%), students' access to IT technology (56.9%), the transformation of the activities/content taught into a digital one (55.4%), teachers' access to IT technology (47.8%), while only 9.5% of teachers stated that they did not encounter difficulties in that period.

The majority of respondents (58.5%) stated that they want teaching activities to take place mainly with physical presence in schools/universities when the epidemiological situation will be favorable, with online teaching remaining only an alternative in extreme situations. Also, being asked to mention the type of teaching methods used during the telework period, most of the teachers and professors (64%) stated that they combined the classic teaching methods with the interactive IT ones.

Most of the teachers and professors (86.3%) agreed that compared to the classic teaching system, with the presence in school/campus, in carrying out the activity in the telework system they made a greater effort, 73% of the respondents claiming that they felt much more tired during that time.

The variables resulting from the answers to the questions in the questionnaire are nominal and ordinal, the coding of the variants being numerical. Thus, single and multifactor ordinal regression models were used to identify the interactions between the independent and

dependent variables. The data analysis was performed with SPSS (ver. 26), being used the LOGIT function to build the ordinal regression model, considered to be the most suitable for the data included in the analysis. Prior to the application of the ordinal regression, an evaluation of the data included in the analysis is required. The cumulative curves of the relative frequencies (figure no. 3) indicate the distribution of respondents, both from the higher education and pre-university education system depending on the extent to which they agree to carry out teaching activities in the telework system and suggest the appropriate regression function to model dependencies between variables. With regard to this last point, it should be noted that most respondents – regardless of the educational environment – have chosen the neutral answer option, while the professors show a higher degree of acceptance of telework than those in the pre-university environment.



**Figure no. 3. Chart of cumulative frequencies according to the degree of acceptance of the work in telework according to the educational environment**

This way of concentrating responses generates a negative coefficient of the independent variable, from the model, in the case of respondents from the pre-university environment. The initial analysis, for testing the Research Hypothesis 1, identifies the influence of the educational environment on the measure of approval of the development of teaching activities in the telework system, the variables included in the analysis being the following:

- Ordinal dependent variable, Item3 – measured on the Likert scale in 5 points, from the answer “Very small”, to “Very large”;
- Nominal independent variable, Item1, with coding “1” for the pre-university environment and “2” for the university environment.

In table no. 3 are presented the estimators of the regression coefficients for the considered model. The estimates labeled *Threshold* are the equivalent values for the intercept, and those labeled *Location* represent the coefficients of the independent variable.

The coefficient for Item1, the independent variable for the category of respondents from the pre-university education system is negative – 1.30, as shown in table no. 3, which means that it is associated with low levels in terms of the measure of approval of the development of teaching activities in the telework system. The testing of the coefficients shows that they are statistically significant, a result highlighted by the level of significance observed ( $Sig.=0.000$ ) (table no. 3), which indicates a significant association between the educational system and the teaching activity in the telework system. The inclusion of the independent variable in the general model determines a considerable improvement of it, in relation to Null Hypothesis (37.281), aspect that highlights the influence of other factors on the dependent variable. This

fact is also confirmed by the Chi-square=8.526, calculated as the difference between the  $-2\text{Log Likelihood}$  values for each model ( $\text{Sig.}=0.036 < 0.05$ ).

**Table no. 3. Regression coefficients and significance tests for each of the independent variables included in the model**

Parameter Estimates								
		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[Item3 = 1]	-2.203	.237	86.346	1	.000	-2.667	-1.738
	[Item3 = 2]	-1.304	.186	49.119	1	.000	-1.668	-.939
	[Item3 = 3]	.776	.167	21.690	1	.000	.450	1.103
	[Item3 = 4]	2.097	.245	73.293	1	.000	1.617	2.577
Location	[Item1=1]	-1.030	.329	9.804	1	.002	-1.676	-.385
	[Item1=2]	0 <sup>a</sup>	.	.	0	.	.	.
Link function: Logit.								
a. This parameter is set to zero because it is redundant.								

To test the adequacy of the ordinal regression model, we used to compare the observed distribution of the sample with the theoretical distribution using Chi-Square statistics for the Goodness-of-Fit Pearson (6.672), respectively Deviance Tests (8.526). The results of the analysis confirm that the model is appropriate, as there are no significant differences between the observed and theoretical frequencies, and the level of significance observed for each *Pearson Residual* statistic is high ( $\text{Sig.} > 0.05$ ).

The obtained results, for testing the Research Hypothesis 1, lead to the conclusion that the educational environment significantly influences the extent to which teachers agree to carry out teaching activities in the telework system.

The use of a regression model with a single independent variable is easier to achieve, but the inclusion of several independent variables in the analysis makes the modeling complex and more appropriate to reality. Thus, in order to analyze the extent to which teachers agree to carry out teaching activities in the telework system, in addition to the educational environment, we will include in the regression model the variables that quantify the degree of effort, as well as the degree of fatigue felt during this period. The proposed multifactorial model includes in the analysis the variables:

- Ordinal dependent variable, Item3 – measured on the Likert scale in 5 points, from the answer “Very small”, to “Very largely”;
- Nominal independent variables, Item1, Item9 and Item10.

A first result of the application of the ordinal regression provides an overview of the share of cases assigned to each level of the variables included in the analysis. At the same time, it is important to note the initial warning presented in the SPSS output, that there are 45 cells with zero frequencies (~53%), the cells with low values of the observed frequencies generating difficulties in calculating Goodness-of-Fit test statistics and evaluating the quality of the model.

To specify the model and the appropriate choice of independent variables, Chi-square statistics are used, which highlight the difference between the residual variance obtained for each of the two models: the initial model without independent variables and the final model with the proposed independent variables. The results obtained show that the chosen regression

model, which includes Item1, Item9 and Item10 as independent variables, is correctly specified and provides good predictions, regarding the second research hypothesis (Hypothesis 2), for the extent to which teachers agree to carry out teaching activities in the telework system. Although the value of the Chi-Square=36.953 (*Sig.* <0.05) indicates that the regression model with independent variables is significantly better than the initial one, this result does not provide information about the quality of the model. Goodness-of-Fit tests were applied to assess how good the model is to test the validity of the model and its adequacy to the analyzed data, Pearson's Chi-Square and Chi-Square variance-based statistics were used, both tests showing that the model is valid and appropriate to the analysis performed.

Analyzing the regression coefficients and significance tests for each of the independent variables included in the model, it is noted that only a coefficient is significant, for a level of significance of 5%, that corresponding to the independent variable *educational environment*, which underlines the significant influence of the educational environment on the extent to which teachers agree to carry out teaching activities in the telework system. The verification of statistically significant differences between respondents in the pre-university and university environment in relation to the extent to which they agree to carry out teaching activities in the telework system was carried out using the Mann-Whitney U test. The result of the (Mann-Whitney U=2209; Wilcoxon W=3070; Z=-3.367) test shows that there are statistically significant differences (*Asymp.Sig.(2-tailed)*=0.001<0.05), which confirms Hypothesis 1, showing a greater desire to work in telework system in university respondents than those in the pre-university environment. Also, the results of applying the test to verify the existence of statistically significant differences between respondents, depending on gender, show that the extent in which female persons agree to carry out teaching activities in the telework system does not differ significantly from those of the male gender (*Asymp.Sig.(2-tailed)*<0.05).

In order to identify the existence of significant differences between teachers, generated by age and teaching experience, regarding the way of reporting to assess the progress of pupils/students, as an impediment to the development of teaching activities in telework system was applied Kruskal-Wallis test. The results obtained as a result of testing Hypothesis 3 indicate statistically significant differences, generated by the age of the respondents from the higher education system (*Asymp.Sig.* = 0.037 <0.05), which shows that the evaluation of students' progress is considered an impediment to online teaching. Also, *age-based analysis* of higher education respondents highlights that assessing student progress is seen as an impediment to online teaching, structuring according to categories of variable experience (seniority) the same subsample does not lead to significant differences in the opinion on student evaluation as an impediment to online activities.

For higher education professors, the variable *experience* leads to significant differences (Kruskal-Wallis test (*Asymp.Sig.*=0.001<0.05) as regards the degree of acceptance of a variety of teaching tools and methods as an advantage, depending on the respondents' choice to carry out teleworking activities (Hypothesis 4: *Telework stimulates the application of interactive learning methods*).

The use of non-parametric statistical methods of analysis, on the data obtained from the application of the questionnaire, has led to the identification of differences in perceptions between professors in the university environment compared to those in the pre-university environment in terms of carrying out activities in the telework system. At the same time, differences were identified within each educational group generated by the gained

experience. In order to validate the results at national level, obtained as a result of the application of the statistical survey and the integration of the results into the formulation of strategies for the development of online teaching methods, it is necessary to extend the research by applying previous methods to a representative sample of teachers.

### Conclusions

The research highlighted a number of characteristics of online education, including: the higher degree of acceptability of online teaching activities in the higher education system, compared to the pre-university education system; making an additional effort in the teaching activity carried out by teachers, with negative effects on their neuropsychic demand; significant differences in the degree of acceptance as an advantage of the wide range of teaching tools and methods; assessing students' progress, as the main impediment to online teaching, etc. The survey highlighted that telework among teachers and professors led to increased levels of stress and effort, classical teaching methods having to be combined with interactive ones, which led to a rethinking of techniques and finding new tools to capture and maintain the interest of students. The main positive and negative effects of telework, as well as the degree of acceptance of teachers in carrying out their work in this type of system, were also brought to light.

A limit to research is the disadvantage of using closed questions in the questionnaire, with interviewers limited to pre-defined response options. The study could be further developed on larger samples to assess the impact of tele after the end of the pandemic and the extent to which it will continue in parallel with face-to-face teaching and physical presence.

The research results can be useful in the correct substantiation of the decisions regarding the dimensioning and evaluation of the didactic activities, as well as of the related processes that the teachers carry out in telework conditions.

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