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EDUCATIONAL RETROSPECTIVE AND USE OF ICT BEFORE THE CONFINEMENT OF COVID-19

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Abstract: The purpose of the work was to identify and analyze which were the elements that influenced the use of ICT in Latin America before COVID-19 by teachers in Latin American countries and independently, in Mexico. The chosen method was the Heckman two-stage selection method. The factors that affect the use of information and communication technologies in teachers to teach classes, the need for budget for technologies in schools, salary and job satisfaction of the teacher were identified. It is concluded that the importance of carrying out this analysis based on historical data allows us to know the situation of educational institutions before the confinement of COVID-19.
Keywords: Adoption, pre-COVID-19, teachers, TALIS, ICT, econometrics

INTRODUCTION

The COVID-19 pandemic caused drastic changes in the entire education system (Zhang, Wang, Yang & Wang, 2020), giving rise to an unexpected educational and management crisis (Adan & Anwar, 2020). Information and communication technologies (ICT) were the main tool used to implement distance education methods. However, teachers and the rest of society as a whole were not prepared for these unforeseen changes, in particular, due to the need to teach classes online to give an immediate response to the non-sanitary measures implemented by all governments (Aguilera Hermida Quiroga Garza, Gómez Mendoza, Del Río Villanueva; Avolio Alecchi & Avci, 2021; García Peñalvo, 2021; Nuere and De Miguel, 2020).

ICTs are an educational resource in the current knowledge society and their use increases with the factors of the global environment (Jordá Borrell & López Otero, 2020). It is essential to adapt teaching methodologies to a more intangible environment, focused on learning by processes and information management (Lamschtein, 2022). Both students and teachers agree to make use of ICT in the teaching process (Ramírez Ramírez, Claudio Martínez & Ramírez Arias, 2020), raising the need to know the different points of view of online classes (Adan and Anwar, 2020). The teacher and the educational institutions may be trained and apt for changes in the environment, but the student is not, the efforts will not yield results (González Pérez, 2019; Rosenberger, 2019, 2020; Sucerquia Vega, Londoño Cano, Jaramillo López & Borba, 2016; Vincentini, 2020).

The United Nations Educational, Scientific and Cultural Organization (UNESCO) appreciated that the factors that determine the progress of a society are research; the innovation; leadership and; The education. The adaptation and use of ICT in the educational environment has become, since the beginning of the first measures applied since the appearance of COVID-19, one of the most relevant topics in studies on the response of teachers to the new educational conditions (Rodríguez Arbitia, Martínez Pérez, Ramírez Montoya & López Caudana, 2020).

In this work, a reflection is carried out on the perceptions prior to COVID-19 related to the educational modality, carrying out an investigation regarding the evolution that teachers have had in recent years, with respect to ICT (Aguilera Hermida et al, 2021). The objective of this work was to identify and analyze the elements that influenced the use of ICT in Latin America before COVID-19 by teachers in Latin American countries and independently, in Mexico. To address this study, the information available in the Teaching and Learning International Survey 2018 (TALIS) database was used.

Four working hypotheses are addressed, on the factors that facilitated or hindered the

implementation of teaching methodologies before the pandemic, through a series of econometric estimates. The hypotheses are the following: 1) the mastery of teachers in the use of ICT has a favorable impact on the use of these methodologies by students; 2) the ICT skills of the teacher favorably influence the importance of increasing the budget to invest in technological resources; 3) the working conditions and teacher training fall on salary satisfaction and; 4) working conditions and ICT domains favorably affect the satisfaction of teaching work.

The importance of this research arises as the prelude to studies that focus on teaching experiences before, during and after the pandemic, given that the research carried out in Latin America has focused mainly on the transition faced by students, leaving aside, the importance of analyzing the technological resources that educational institutions provided to teachers. It is necessary to explain the motivations of the teachers that led them to use ICT before the pandemic to understand their adoption, complications and facilities that they had during confinement. TALIS is the first international work that addresses the educational environment, the nature of learning dynamics and the terms in which teachers work, providing enough information to develop various investigations. In this research, it was decided to add other factors not considered in TALIS 2018, such as the country's gross domestic product and poverty, as they are elements that, during the pandemic, played decisive roles.

METHODOLOGY

DATA

The work focuses on the database obtained from the TALIS 2018 questionnaires, led by the Evaluation of Educational Achievement (IEA), with the collaboration of the Organization for Economic Co-operation and Development or by its acronym OECD (Organization for Economic Co-operation and Development). -operation and Development ([OECD], 2019a).

The questions asked in the questionnaire considered information on beliefs, attitudes, perceptions and information related to the facts (OECD, 2019b). TALIS carried out two types of surveys, one for teachers and another for managers, in addition to the fact that it is carried out every three years. In this work, only the 2018 survey of teachers at the secondary level for Latin America was selected.

TALIS 2018 is chosen because, as of the date of completion of this work, the 2021 report has not been published. The variables chosen were related to the use of ICT, teaching methods, teacher satisfaction, resources used and provided by the educational institution. It was decided to include the Gross Domestic Product (GDPcapita) and country poverty (The World Bank, 2022) for the years 2018 for Argentina, Brazil, Colombia and Mexico, and 2017 for Chile, due to the lack of information in the source as supplements. variables that were not considered in TALIS 2018. Table 1 details the variables that were chosen for the study, the name of each variable followed by its definition, type, range of values, and the source of the data obtained.

ECONOMETRIC METHOD

The database used in this study allowed us to delve into aspects related to the use of technologies at pre-university levels. The TALIS 2018 questionnaire allows us to know the environment in which the learning and work strategies of teachers are developed in schools, therefore, with the information obtained, the four hypotheses were estimated. According to the database, the binary variables that contain qualitative information derived from the answers given

Name of the variable	Type	Definition	Values
AperturCamb	D	Degree of openness to change	0= Another case 1 = Agree, totally agree
AprendTIC	D	Support student learning through the use of digital technology (eg, computers, tablets, electronic whiteboards)	0= Another case 1= Quite a lot
CategMateria	D	Category in which the subject taught is included	0= Another case 1= ICT subject
EdadDoc	C	Teacher's age	0= Another case 1= 25 to 29 years 2= 30-39 3= 40-49 4= 50-59 5= Over 60 years
EligeMetEnsz	D	Degree to which the teacher chooses teaching methodologies	0= Another case 1= agree
FaltApoyDesProf	D	Impediment to professional development: Lack of support from superiors	0= Another case 1= agree
FormTIC	D	ICT training that teachers had during their preparation as a teacher	0= Another case 1= yes they had
GeneroDoc	D	Teacher gender	0= Female 1= Male
IndDestrzTIC	D	ICT content included in your professional development activities in the last 12 months	0= Another case 1= yes they had
MasPresupuesTIC	D	Importance of investing in ICT if the budget were to increase	0= Another case 1= High importance
MasSalario	D	Salary increase in the last 12 months	0= Another case 1= Yes
MatTIC	D	ICT subject taught by teachers to their students in the educational center	0= Another case 1= Yes it is taught
NecDestzaTIC	D	Teachers need to improve or update ICT skills	0= Another case 1= yes you need it
PrepaTICIE	D	ICT training is given in formal training when entering the educational center	0= Another case 1= yes they had
RecTIC	D	Let students use ICT resources (Information Technology and Communication) to carry out projects or do exercises in class	0= Another case 1= Always, frequently
SatisfaSalario	D	Degree of satisfaction in the salary received	0= Another case 1 = Agree, totally agree
SatisfaTrabajo	D	Degree of job satisfaction in general	0= Another case 1 = Agree, totally agree
TipoContrato	D	Employment situation according to the type of contract	0= Another case 1= Permanent employee
Title	C	First teaching qualification	0= Other case 1= I do not have any related formal qualification 2= Specific training 3= Rapid or specialized teacher training and 4= Regular consecutive teacher training 5= Regular concurrent teacher training 6= Education or training in another pedagogy

Table 1: Definition of variables

Note. Own elaboration. D: dichotomous variable, C: categorical variable that can take different values.

Source: OECD (2019a)

by the teachers predominated. In general, in these cases, the dependent variables used were dichotomous that can take only one state, zero or one (Villarruel Meythaler, Tapia Morales, Cárnedas García, 2020).

In general, estimates that have a considerable number of dummy variables face a problem of sample selection. This type of problem is generated when the choice of individuals to participate in a study is not completely random. The information provided by TALIS 2018 incurred a sampling bias of this nature that had to be corrected. In recent times, various methodologies and proposals aimed at correcting sample selection biases have seen the light of day. One of the most widely used methods is Heckman's (1979) selection correction procedure.

The Heckman selection model arises when non-random samples are chosen within the studies, obtaining biases caused by missing information. These lags are identified with the name of selection biases. When applying regressions, there may sometimes be data losses that, with the selection bias analysis, can be calculated by obtaining the specification error. By having hidden information, the results obtained are biased (Heckman, 1979).

DATA MANAGEMENT AND ANALYSIS TOOLS

The tool used in the analysis process was the statistical software STATA 14. The database used was TALIS 2018 in a refined version, with information from teachers at the secondary level, from the countries of Argentina, Brazil, Chile, Columbia and Mexico. The GDPcapita and poverty information for each of the selected countries was added to the refined database. The chosen method was the Heckman two-stage selection method. The analysis was applied in two ways, the first focusing on Latin America as a whole and the second exclusively on Mexico.

ANALYSIS OF RESULTS AND DEVELOPMENT

Before the pandemic, the use of technology by teachers consisted of a channel to transfer information and documents from teachers to students. Santamaría Mariscal, San Martín Gutiérrez and López Catalán (2014) considered that the use of ICT must be a constant in the pedagogical area.

Rodríguez Arbitia et al. (2020) considered that all individuals must make use of technologies. Leng, Gu and Dalte (2015) concluded that it is crucial to provide technological resources to students, training teachers in these tools. The lack of knowledge of teachers about the incorporation of ICTs became a challenge, resulting in students being overwhelmed by school activities (Vicentini, 2020). The first hypothesis linked the skills of teachers in the use of ICT, with the probability that their students used the technologies in their school activities (García Arango, Villareal Fernández, Cuéllar Rojas, Echeverri Gutiérrez, Henao Villa & Botero Grisales, 2020).

FIRST HYPOTHESIS: IT ESTABLISHES THAT THE MASTERY OF TEACHERS IN THE USE OF ICT HAS A FAVORABLE IMPACT ON THE USE OF THESE METHODOLOGIES BY STUDENTS.

The fact that the teacher allows students to use ICT to carry out projects within the class was established as a dependent variable, which adopts the value 0 in the event that students do not use ICT in their projects and their class assignments and, the value 1 if so.

Among the determinants of the propensity to use ICT are possible facilitators: the need for teachers to update their ICT skills; ICT training provided by the center; experience in the use of ICT in academics; ICT content in their training; support for student learning

with the use of digital resources; importance of investing in ICT; freedom they have to choose the teaching method; the age and gender. Also included in the estimates are the GDPcapita and poverty level of each of the five countries considered in this study, control variables that aim to capture the idiosyncratic aspects of each of the countries under study.

The variables for the selection equation were: ICT training of teachers during their magisterial preparation; the type of contract with the institution; support for learning with digital resources; impediments to professional development; the category in which the subject taught is considered ICT; the degree of openness to change; age; gender and country.

In the second hypothesis, the resources available to carry out their teaching and student activities were addressed. The reality that the teachers faced to carry out the challenge of making the classes creative differed depending on the profile of the teaching staff, the resources made available to them by the management and the characteristics of the group that received the technologies. In case of not having the budget to acquire the resources, the teachers avoided taking classes based on technologies, such as: infrastructure, training, tools and digital equipment (Linne, 2020).

Tinajero Villavicencio (2016) indicated that the lack of resources becomes a limitation for the implementation of ICT that, not having a budget, prefer to dedicate the resources to the basic needs of the operation of schools, forcing teachers to buy your own tools. There were countries that considered making investments in ICT. In the case of Latinos, high levels of technological use were recorded, but on social networks, having a direct effect on the gross domestic product (GDP). Investments were made in ICT in Latin American countries, but it was not reflected in the academic level of the students (Useche Castro, Pérez Parra & Márquez Pérez, 2020).

For a country to qualify as a technological society, the International Communications Union indicated that they must comply with three phases: a) "ICT preparation: level of network infrastructure and access to ICTs"; b) "ICT intensity, level of use in society; 3) "ICT impact, as a result of the more efficient and effective use of ICTs". Useche Castro et al. (2020) carried out an investigation between the investment and its effect on the educational level, concluding that, in Latin America, even if investments are made in technologies, there are no favorable results in educational performance because the ICT intensity stage is not closed. including teacher training.

In this second hypothesis, the factors that affected the investment of an ICT budget within the institutions were reviewed with respect to various personal factors and the environment of the teaching staff, according to the country where they developed their educational activities.

HYPOTHESIS 2: ESTABLISHES THAT THE TEACHER'S ICT SKILLS FAVORABLY AFFECT THE IMPORTANCE OF INCREASING THE BUDGET TO INVEST IN TECHNOLOGICAL RESOURCES

There are few investigations that have determined the effect of investing in technological resources within schools (Useche Castro et al., 2020. The factors selected to determine the influence on the probability of requiring the budget were age; gender; GDP, country poverty For the selection equation, the variables are the same as in hypothesis one.

In the third hypothesis, the relationship between the activity carried out by teachers and salary satisfaction was addressed. Considering that educational action is of great importance for social coexistence and

the development of countries, it is easy to conclude that one of the key elements for the proper functioning of the educational system is the personal and professional satisfaction of the magistrate. The degree of satisfaction, as a result of the work, affects the person and the people who interact with him.

There are two types of economic remuneration, base salary and bonus. It has been found that there is a higher salary in the public school sector than in the private one, as well as the free choice of teaching techniques and working conditions. Different professions that are not teachers are taking teaching as a second option, generating a high supply of teachers, causing unemployment (Candray Menjívar, 2019). When the salary conditions are similar between both fields, it has been found that the workload for teachers in private schools is higher. There are differences between government schools and paid ones (Bayona Rodríguez & Melo, 2020).

Franco López, López Arellano and Arango Botero (2020), citing Locke, defined satisfaction as a subjective emotion of liking on the part of the worker. Regarding the salary factor, there is literature that contradicts what was indicated by Bayona Rodríguez and Melo (2020), that is, teachers from private centers have a better income. Franco Lopez et al. (2020) identified that the variables that positively affect teacher job satisfaction are salary, intrinsic value, and recognition by society.

In the third hypothesis, the effects of the working conditions and characteristics, personal and of the country, that the professors had on their salary satisfaction were studied. A positive response was expected in the results obtained, that is, a value of 1 when the degree of satisfaction regarding the teachers' salary is high and they are satisfied, and 0 in another case.

HYPOTHESIS 3: THE WORKING CONDITIONS AND TEACHER TRAINING AFFECT SALARY SATISFACTION

The fact that the teacher was satisfied with his salary was established as a dependent variable. This variable depended on the obstacles encountered during his professional development with the support of his superiors; the type of contract; if he had a training to be a teacher; the type of subject taught; age; gender; GDP and poverty of the country. For the selection equation, they were the same variables as the previous hypotheses.

The fourth hypothesis addressed the job satisfaction of teachers when they used ICT before the pandemic. Castañeda Santillán and Sánchez Macías (2022) state that COVID-19 highlighted the lack of strategies to deal with large-scale situations, generating discomfort among teachers. For this reason, they analyzed the relationship between teacher job satisfaction and the stress they experienced during the pandemic, better known as Bournout syndrome (SB) or professional burnout.

The SB is the response that a worker gives when he perceives the difference between his own ideals and the reality of his working life (Treviño Reyes, López Pérez, 2022). Among the findings of Castañeda Santillán and Sánchez Macías (2022) it was found that no teacher in the study presented the BS, concluding that they found no relationship between job satisfaction and teacher stress.

Sánchez Cañizares, Fuentes García and Artacho Ruiz (2007) studied the impact of gender on job satisfaction, considering sociodemographic factors, job qualities and the institution. In their results, they demonstrated that there is an influence of gender, sociodemographic factors and the position on job satisfaction. Pujol Cols (2016) indicated that the teaching staff must be

considered in strategic planning. The results obtained indicated that the variables that determine the job satisfaction of university professors are age and the hierarchy of their position. Bayona Rodríguez and Melo (2020) mentioned that the quality of education increases when the teacher feels happy in his job and the conditions in which he operates, highlighting that, in this case, the salary would not be considered. Therefore, they recommend carrying out studies that identify what factors motivate teachers to feel comfortable with their employment.

In this fourth hypothesis, the relationship of working conditions (Rodas Hernández & Pérez Azahuanche, 2021), personal and national, in which the teacher developed to feel satisfied in his work, was addressed. We wanted to verify the positive relationship between said satisfaction with the factors of his development within the educational centers. With a value of 1 if the teacher agrees to be satisfied with his work and 0 otherwise.

FOURTH HYPOTHESIS: ESTABLISHES THAT THE WORKING CONDITIONS AND DOMAINS OF ICT HAVE A FAVORABLE IMPACT ON THE SATISFACTION OF TEACHING WORK

According to the aforementioned literature, job satisfaction was selected with the independent variables, by the type of contract of the teacher within the school; salary increase in the last year; age, gender, country and country poverty. For the variables of the selection equation, it was decided to take the same ones for all the hypotheses.

RESULTS

DETERMINANTS OF THE USE OF ICT BEFORE THE PANDEMIC IN LATIN AMERICA

With the information obtained from the analyzes carried out in STATA 14, Table 2 presents the estimates made for the group of countries, through the Heckman model. In a first stage, a series of determinants showed the effects of certain individual characteristics of teachers when it comes to having experiences and skills related to the use of ICT in teaching processes.

INTERPRETATION HYPOTHESIS 1

The results revealed that the probability that teachers supported student learning through the use of ICT was directly related to their ability to choose teaching methodologies. He highlighted the support of the centers to facilitate the application of digital methods and the teacher's degree of openness to change, having a positive impact on the probability of using ICT in classes. The category of the subject to be taught was a positive factor. The contractual modality of the teacher did not have a clear incidence on the propensity of teachers to implement ICT, such as age, ICT content in their professional development one year before answering the survey, the need to require more budget and the relationship of the matter with technologies.

The causes that caused the probability of use of digital resources to drop were due to GDP. In a very small proportion, the effects of the need to update digital tools, the poverty of the country, age, the impediment in their professional development due to the support of superiors and the type of contract were also had.

	RecTIC	MasPresupuesTIC	SatisfaSalario	SatisfaTrabajo
Equation	**H1**	**H2**	**H3**	**H4**
AprendTIC	0.165*** (-0.0136)			
CategMateria			-0.0155 (-0.0173)	
EdadDoc	0.0322*** (-0.00385)	0.0275*** (-0.00352)	0.00322 (-0.00373)	0.0132*** (-0.0022)
EligeMetEnsz	0.463*** (-0.0101)			
FaltApoyDesProf			-0.162*** (-0.00803)	
GeneroDoc	-0.0112 (-0.00894)	-0.0401*** (-0.00863)	0.00883 (-0.00906)	-0.0181*** (-0.00543)
IndDestrzTIC	0.0735*** (-0.008)	0.0641*** (-0.00866)		
MasPresupuesTIC	0.0591*** (-0.00801)			
MasSalario				0.0295*** (-0.00716)
MatTIC	0.0825*** (-0.00999)			
NecDestzaTIC	-0.0344*** (-0.00771)	0.0355*** (-0.0083)		
PrepaTICIE	0.00297 (-0.00786)			
TipoContrat			-0.0399*** (-0.00555)	0.0226*** (-0.00399)
Titulo			-0.0154*** (-0.00275)	
PobrezaPais	-0.0342*** (-0.00244)	-0.0110*** (-0.00231)	-0.003 (-0.00252)	-0.0170*** (-0.00143)
GDPcapita_log	-0.537*** (-0.0528)	-0.478*** (-0.0501)	-0.0752 (-0.0578)	-0.220*** (-0.0312)
Constant	7.021*** (-0.635)	5.851*** (-0.598)	1.636** (-0.684)	3.938*** (-0.371)
Selection equation	FormTIC			FormTIC
AperturCamb	0.0811*** (-0.021)			0.0811*** (-0.021)
AprendTIC	0.445*** (-0.0196)	0.438*** (-0.0195)	0.437*** (-0.0197)	0.445*** (-0.0196)
CategMateria	0.359*** (-0.0462)			0.359*** (-0.0462)
EdadDoc	-0.0823*** (-0.00735)	-0.0909*** (-0.00724)	-0.0937*** (-0.0073)	-0.0823*** (-0.00735)
FaltApoyDesProf	-0.0633*** (-0.0195)			-0.0633*** (-0.0195)
GeneroDoc	0.0279 (-0.0195)	0.0256 (-0.0194)	0.026 (-0.0195)	0.0279 (-0.0195)
TipoContrat	-0.144*** (-0.0144)			-0.144*** (-0.0144)
MatTIC		0.334*** (-0.0256)	0.329*** (-0.0258)	

EligeMetEnsz		-0.00792 (-0.0248)	0.000705 (-0.0251)	
Constant	0.923*** (-0.0535)	0.586*** (-0.0421)	0.584*** (-0.0424)	0.923*** (-0.0535)
Dummies país	Si	Si	Si	Si
Lambda	-0.437*** (-0.0353)	-0.186*** (-0.0247)	-0.399*** (-0.0268)	-0.261*** (-0.0161)
Rho	-0.82638	-0.38514	-0.75971	-0.81273
Sigma	0.52876881	0.48349593	0.52557519	0.32137774
Notes	20428	20611	20267	20428

Table 2 Determinants of ICT use (Argentina, Brazil, Chile, Colombia and Mexico)

Note: Own elaboration. Standard error *** p<0.01, ** p<0.05, * p<0.1. Source: State 14

Equation	**H1**	**H2**	**H3**	**H4**
	RecTIC	MasPresupuesTIC	SatisfaSalario	SatisfaTrabajo
AprendTIC	0.150** (-0.0194)			
CategMateria			0.0257 (-0.039)	
EdadDoc	0.0218 (-0.0144)	0.0204** (-0.00979)	0.0171 (-0.0107)	0.00422 (-0.00328)
EligeMetEnsz	0.528*** (-0.0262)			
FaltApoyDesProf			-0.214*** (-0.023)	
GeneroDoc	-0.0415* (-0.0238)	-0.0306 (-0.0213)	-0.00409 (-0.0226)	0.00331 (-0.00698)
IndDestrzTIC	0.029 (-0.0199)	0.0358* (-0.0212)		
MasPresupuesTIC	0.0532** (-0.0208)			
MasSalario				0.0250* (-0.013)
MatTIC	0.0486** (-0.0231			
NecDestzaTIC	-0.0233 (-0.0194)	-0.0109 (-0.0208)		
PrepaTICIE	0.0125 (-0.0224)			
TipoContrat			-0.0177 (-0.0159)	0.00226 (-0.00505)
Titulo			0.00116 (-0.0058)	
Constant	0.234 (-0.173)	0.758*** (-0.0563)	0.622*** (-0.0707)	0.969*** (-0.0212)
Ecuación de selección	FormTIC	FormTIC	FormTIC	FormTIC
AperturCamb	0.111* (-0.0567)			0.111* (-0.0567)

AprendTIC	0.353*** (-0.0499)	0.343*** (-0.0497)	0.333*** (-0.0499)	0.353*** (-0.0499)
CategMateria	0.172* (-0.0929			0.172* (-0.0929)
EdadDoc	-0.0717*** (-0.0212)	-0.0731*** (-0.0207)	-0.0740*** (-0.0208)	-0.0717*** (-0.0212)
FaltApoyDesProf	-0.0478 (-0.0532)			-0.0478 (-0.0532)
GeneroDoc	0.0162 (-0.0499	0.0258 (-0.0496)	0.0194 (-0.0499)	0.0162 (-0.0499)
TipoContrat	0.0347 (-0.0359)			0.0347 (-0.0359)
MatTIC		0.210*** (-0.0591)	0.202*** (-0.0595)	
EligeMetEnsz		0.0453 (-0.0671)	0.0438 (-0.0675)	
Constant	0.408*** (-0.126)	0.476*** (-0.104)	0.474*** (-0.105)	0.408*** (-0.126)
Lambda	-0.5483 (-0.32)	-0.242** (-0.106)	-0.185 (-0.115)	-0.0335 (-0.0347)
Rho	-0.95909	-0.50149	-0.37257	-0.2167
Sigma	0.5717	0.4834	0.4969	0.1543
Notes	2893	2926	2870	2893

Table 3 Determinants of the use of ICT MEXICO

INTERPRETATION HYPOTHESIS 2

The results indicated that the teacher's support for learning through the use of digital tools, together with the fact that the ICT subject was taught, caused an increase in the need for economic resources, revealing that it was important to have financial resources to that schools stand out in the use of technologies and improve their quality. The GDP played a determining role in causing the need for the ICT budget to drop, as well as the integration of Argentina and Brazil.

INTERPRETATION HYPOTHESIS 3

The probability that the teacher would be more satisfied with his economic remuneration was mainly affected by the subject he taught, since it was related to technology.

It must be noted that, in this hypothesis, there were more variables that decreased teacher satisfaction towards their salary: the lack of support in their professional development, the type of contract, the first degree, age, consider Argentina, Brazil and Mexico. A fact that became evident in the results of the hypothesis was the greater number of non-significant statistical elements, such as the category in which the class taught falls, the age in the main equation, the GDP, the gender of the magistrate, poverty of the country studied, the choice of teaching methodology and that Chile was present.

INTERPRETATION HYPOTHESIS 4

The probability that the teacher felt comfortable with his job depended, to a large extent, on the support he provided to learning with the use of technology. The characteristics that negatively affected the teacher's liking was selecting Argentina together with Brazil and the type of contract, and this was logical since, if the teacher taught several subjects and was on a temporary contract, his benefits could be affected. Other variables that had an unfavorable effect were gender and age. Women showed greater satisfaction than male teachers, older teachers were also more pleased.

DETERMINANTS OF THE USE OF ICT BEFORE THE PANDEMIC IN MEXICO

After addressing the main determinants of use in teaching environments of digital methodologies for five Latin American countries, the analysis focused on Mexico. For this, a database was used with the information provided by about three thousand questionnaires answered by the teaching staff.

In order to facilitate the comparison between the sample from the five countries and, in the particular case of Mexico, although the hypotheses proposed were identical, the econometric estimates recorded some changes related to the control variables referring to the characteristics of each country. country. The results of the four hypotheses addressed are presented in Table 3.

In relation to the first hypothesis, changes were seen in the probability of the use of ICT by the students in their projects, taking into account the effect of selecting only Mexico. It was found that the freedom of the teacher when choosing his way of teaching had a high positive impact on the fact that the students got used to using ICT, followed by the teacher's support to make use of digital resources, of the type of subject that was studied. imparts and openness of the magistrate to adapt changes. Third, it was found that the teacher, being older, made less use of ICT and this could be due to a lack of training or the use of traditional teaching techniques.

When hypothesis two was addressed, educational institutions were affected in the use of economic resources when teachers supported the way of teaching students through ICT, as well as the type of subject

related to the digital area. Later, when teachers focused on promoting technology, it was logical for schools to look for a way to acquire them.

Regarding the third hypothesis, it was found that, for a teacher to be happy with the economic remuneration, he must have had support in carrying out teaching activities with the use of ICT, adding the subject taught. The lack of helping the magistrate to develop by his bosses, generated a discrepancy in salary.

The fourth hypothesis concluded in the foreground that, in Mexico, a teacher was satisfied with his work due to his openness to changes, the use of digital tools at school and the type of subject he taught them. In the case of age, it is the only variable that is significant and that generates a reduction in job satisfaction, that is, teachers feel better when they are younger.

DISCUSSION OF RESULTS

When comparing the results obtained for the five Latin countries and the particular case of Mexico, some changes are observed. In hypothesis one, reduction in the effect of the use of digital resources when the subject is related to ICT, when the class is related to technology. Regarding gender, it becomes a factor that does influence the teacher to allow the use of ICT in school projects. The age, the training in the use of digital tools in the school at the entrance of the teachers, the need to improve ICT skills and the type of contract that they had, cease to have an effect within the hypothesis.

In TALIS 2018 it was found that teachers had training in the use of ICT for teaching, in addition to ensuring that they feel well prepared to carry out their activities with ICT. This is contradicted by González Pérez and De Pablos Pons (2015), where they mentioned that teachers are not prepared for the use of ICT due to lack of time. Tumino and Bournissen (2020) recommended carrying out studies that evaluate the advantages of ICT adoption to measure its impact in the classroom.

The results obtained in this study show that several factors must be considered so that, in Latin American schools, the environment that favors the use of technologies is generated, so it is necessary to carry out studies for each country, taking into account their environments and particular resources, as indicated by Campos Cruz (2019).

Hypothesis two presents differences in Latin countries and Mexico. ICT induction for teachers with technology-supported learning, age and the fact that the subjects were part of the digital area reduce the probability of requiring more financial resources in Mexico. Age and the requirement to train teachers in ICT cease to have an effect. Therefore, Useche Castro et al. (2020) are right that investments may exist, but it is not reflected in academic activities.

Shaikh and Karjaluoto (2015) identified that institutions typically do not invest in ICT when they do not benefit or use it. In this case, it can be observed that, when the teacher has the skills to use them, there is less response to invest in ICT, and this may be due to the fact that there is no need to provide teachers with more elements, considering that they have the basics. to perform the job.

In the third hypothesis, it is observed that by including Mexico only, the support of superiors towards teachers, the help to promote ICT in tasks and the class classification in technologies, reduce the probability that the teacher is satisfied. with your payment. The type of contract and professional training no longer contribute to the taste of economic remuneration. Campos Cruz (2019) and Gautreau (2011) mentioned that the attitude of the teacher and his knowledge are not drivers for the teaching staff to adopt ICT,

but rather that the main factor is monetary remuneration. It is necessary to corroborate with studies in Mexico and Latin countries the information reflected by Bayona Rodríguez and Melo (2020), where teachers see better salary remuneration in the public sector.

In the fourth hypothesis in Mexico it is observed that the increase in job satisfaction is due to the teacher's condition to adapt openness to change. Supporting student tasks with digital resources and the class category lower the probability of satisfaction. Finally, the age, gender, type of contract and the scant support of the bosses or supervisors to the professional development of the magistrate, do not cause an increase or reduction of the teacher's satisfaction in his work.

In this last hypothesis, it can be mentioned that leadership in Latin America is not important for the teacher to feel happy in his workplace, being contrary to the results of the research by Simbron Espejo and Sanabria Boudri (2020). It is advisable to carry out focused studies, after the pandemic, regarding the job satisfaction of teachers in private and public institutions (Bayona Rodríguez and Melo, 2020).

CONCLUSIONS

The results obtained and the conclusions presented in the reports published by the OECD through the TALIS 2018 present the practices that both managers and teachers have within schools at the basic level. The OECD shows statistics and analysis of studies that help to understand how institutions perform globally and at the country level.

The importance of carrying out this analysis based on historical data allows us to know the situation of educational institutions before the confinement of COVID-19, revealing that for many years teaching has received little attention from governments with robust strategies. Little-studied techniques, as well as the different components that add or subtract from the improvement of educational processes, with respect to the use of ICT, are emerging on a daily basis (Orantes, 2010). The collaboration of the same teacher to contribute to the teaching, within his capacities, are indicators of his interest in wanting to offer a quality class and teaching.

It is evident that Mexico has other areas of opportunity in which to work, but in general, Latin America must generate methodologies and efforts that lead to creating students and teachers ready to receive education with different techniques, ready to face change and, above all, to make use of technological tools, not only for fun (Useche Castro et al., 2020) but to improve educational quality.

Creativity in the education sector in Latin America must be one more effort that teachers and administrators must expand (Linne, 2020), and this can be done based on technologies. The use of social networks is a common factor among Latino youth, and may be the direct way to create an attractive educational system for students. For this, a complete infrastructure must be available to schools (Useche Castro et al., 2020),

The gap in access to resources that teachers in the private and public sectors have (Bayona Rodríguez & Melo, 2020) is an area to work on. Many teachers have the best intention of applying innovative techniques and attending updates in their technological skills, but there is not enough support. It must be taken into account that the magistrate is made up of people who have invested so much in their education, training, instruments, equipment, time, etc. that must be paid like others.

The results of the TALIS 2018 questionnaire have been the last to be published so far. Currently, work is being done on the next publication that will be recognized by the name of TALIS 2024. It is strongly recommended that the information published

in this questionnaire be used. new report, given that the results of thousands of teachers and administrators, globally, involved at the time of confinement will be included. The database will allow researchers interested in the educational environment and, above all, in the technological one, to know and analyze teaching practices in large-scale events. The purpose is to improve the strategies of academic services, providing professionals with essential tools, such as ICT.

Despite the efforts made by all (governments, educational centers, teachers, students, etc.) they were not exempt from problems despite the fact that they applied appropriate methods for a distance methodology. Among the main obstacles that limited the transition from a face-to-face teaching system to a virtual one, the following stand out: lack of time necessary for planning; There were a multitude of connectivity and equipment problems for both teachers and students; education and training deficits on the part of the teaching staff; lack of student preparation; resistance from some educational centers to make the necessary investments; passive attitude on the part of the teachers who resisted adapting to the new educational environment imposed after the pandemic.

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